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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

Vol. CXLIII. No. 2885.] LONDON, AUGUST 27, 1918. [70th Year. Price 6d.

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXLIII., No. 2885.] TUESDAY, AUGUST 27, 1918. [70TH YEAR.

EDITORIAL NOTES.

Calorific Power of Gas and the Coal Situation.

"COAL is the key of victory," wrote Marshal Foch in his appeal to the British miners to help him by a greater production of coal. We do not agree that the brilliant Marshal's metaphor is quite correct. Coal is the "store," the "lock," or any other suitable description that may be applied. But carbonization is the "key" to that store or lock; and it is well to keep the fact before the authorities in these days of gloomy coal prospects. The seriousness of the position has been emphasized again during the past week by columns of matter in the lay Press, appealing to the miners on the one hand to use every workable hour and minute in producing more coal, and to consumers of all classes and conditions to economize in every way that will mean a direct or an indirect saving of coal. For whatever else happens, the advantage in initiative now gained by the Allies on the Western Front must not be lost through want of coal and the products derived therefrom. It is the business of the Ministry of Munitions to see to this in collaboration with the Coal Controller.

But there is another point to which we at once wish to draw the attention of the Ministry in connection with the deplorable situation to which the supply and distribution of coal have been allowed to fall in full face of the military possibilities and requirements in France and Italy. There cannot now be the shadow of a doubt that coal supplies to the gas industry will this coming winter be in a chaotic state; and the fear grows that there will not be the quantity that will be required. Nothing short of a miracle will now put into store all that is needed with shortening days upon us, and weather conditions certainly coming that will impose their restrictions upon coal and other goods traffic. With all the anxious efforts that are now being made by the Coal Controller, with all the belated methods that are to be applied to induce greater output, we do not expect miracles to happen; and there seems little ground for hope that the methods that are to be put into operation will do anything more than relieve a most unholy mess. This being so, reminder may be given to the Ministry of Munitions of their recent Order made in reference to gas supply under the Defence of the Realm Regulations, which Order protects gas undertakings from forfeiture for failure to comply with statutory requirements as to illuminating power or calorific value, providing that they comply with the terms laid down. The terms were that coal gas should be of 500 B.Th.U. gross *before* washing for benzol and toluol extraction; and that where a mixture of coal and water gas is used, it should not, in any circumstances, fall after washing below a minimum of 450 B.Th.U., and that only to maintain this minimum is oil to be employed without the previous authority in writing of the Ministry of Munitions. Although no minimum calorific power is stated in the Order where coal gas only is supplied, the Metropolitan Gas Referees, according to the recent modification of their "Notification," appear to read 450 B.Th.U. as the intention of the Order in all circumstances. At the time the Order was issued by the Ministry, we remarked [*ante* p. 11] upon the somewhat scanty protection given by the Order in these days of short and poor quality coal deliveries to gas-works; and fear was intimated that, under the strain of the times, something would have to give somewhere in the regulation imposed upon gas undertakings even with the easier conditions allowed by the Ministry of Munitions.

Assuming that the anticipation of a shortage of coal deliveries to gas-works will be realized (this ought to be avoided, if possible, in view of the war materials required from coal carbonization), are gas undertakings still to comply with the new Order issued by the Ministry, or help the community and the Coal Controller as much as possible by supplying gas (where their conditions will allow them to do so) of a much lower calorific power, but still of good combustible quality, which will give a good flame temperature? Public convenience ought to be studied before official regulation. But if the authorities determine that gas undertakings may work so as to serve the public to the utmost measure of their power under the extraordinary position of coal supply and demand not only at home but in France and Italy, then the public must be properly informed of the cause of the change in the character of the gas—though the chances are that most people would not realize, without the information, that there had been a change. The public have had to submit to a dilution of bread by unusual ingredients; and the loaf has cost considerably more both to the producer and the consumer. Italy, as we saw the other day, has, through the coal conditions there, to be satisfied with gas of a calorific value of only about 225 B.Th.U. per cubic foot; and, in other countries, the calorific power of the gas has sunk far below what the Ministry of Munitions here has prescribed as the level to which their protection should extend.

Judging from the coal prospects as portrayed by the Coal Controller, the choice of the Ministry of Munitions rests between adhering to their calorific power regulation with the risk of breakdowns of gas supply, and assisting the Coal Controller through gas undertakings the conditions of which will permit them to produce per ton of material used more gas of a lower calorific value than the prescription made for protection purposes—this assistance being rendered on the ground that fuel of lower calorific value than that prescribed will be better than no fuel at all. We are more convinced than ever that, in all these prescriptions and rationings affecting fuel and lighting, sufficient consideration has not been given by the departments conjointly as to the value that gas undertakings could be to the Coal Controller and other Government Departments, if they were allowed proper flexibility, and given the means to work up to their maximum efficiency. But officialism cannot shake itself clear of the foolish notion that, even in these times—with such conditions as those confronting in regard to fuel supplies—bit and curb must be applied, instead of allowing the patriotic to work with freedom to best meet unprecedented conditions, and alleviate to their maximum capacity the hardships of the community.

We urge that this matter should be at once considered in association with the Coal Controller's other measures for securing some, if not complete, relief from the gloomy state of affairs that threatens the country next winter. The formidable hardship in the matter of fuel, though just sprung upon the public (as is the wont of the Coal Control Department in respect of increases of price), is not something that has only lately entered upon the process of formation. It is months ago now that it was known that Italy had to be supplied with largely increased quantities of coal; and the promise to our Ally has not been wholly fulfilled since. The increased needs of France, through the domination by the Germans of the mines in the coal district of the Pas de Calais, is not a development of the last week or two. The growth of the American Expeditionary Force is not something that has happened in a night. The removal for military purposes of further miners from the coal surfaces this year apparently did not take into account, and leave, a coal margin for military possibilities. Avoidable absenteeism

among the miners is not a fresh discovery; it is an ancient evil. Months ago miners of low medical category might have been taken from the army and put back into the mines; and all the appeals that are now being made to the miners could have been urged with equal force on the same grounds weeks ago—we might almost say months. Summer time has been lost; and we are fast speeding into the months of climatic severity, when physical endurance is not so great for resisting those conditions that the people are just now asked to suffer. The time has been largely spent upon evolving complicated rationing schemes for fuel, of which seemingly there will not be sufficient to meet the rations—the final scheme allowing, among other provisions, electricity purveyors to use (on the average) about 1½ tons of coal to produce the 800 "fuel" units of electricity granted for every ton of coal that is displaced, while giving the householder only 15,000 c.ft. of gas per ton of coal relinquished, though (as we have pointed out ever since the terms of the Order were indicated) the thermal value of the products of the ton of coal is immensely in excess of the gas allowance, whether the coke be used solid or converted into gas. No one outside those in the confidence of the Coal Controller knows the basis upon which these allowances were made; but practical men cannot see in them justice, nor any rational consideration of the coal situation. We have examined them again in the light of what Sir Guy Calthrop has been saying to the miners, and in the light of the campaign that is now under way, and the figures are more mystifying than ever. However, we commend to the immediate consideration of the Ministry of Munitions and the Coal Controller the remarks made in the early part of this article as to the, in the present emergency, relaxation of the recent Order dealing with the calorific power of gas. Otherwise trouble will be intensified next winter; and at best the trouble will, according to the Coal Controller's own prognostications, be severe enough.

A Perilous Margin for Gas Coal Stocks.

The situation in respect of gas-works coal stocks is getting more and more acute; and it is evident that the Coal Controller intends that public utility undertakings shall only live a little better than from hand to mouth. In other words his proposal is that they shall merely have a margin which, under the unknown conditions of winter, will place many gas undertakings in a position of extreme peril. If there was an assurance that the margin he proposes could be maintained throughout the country and through the winter, all would be well. But there is no such assurance. According to an announcement made at an interview which representatives of gas undertakings had with the Controller a few days ago, the position to be faced is that supplies will now be diverted from gas-works which have in hand a stock of four weeks or over of their winter's consumption, based on the peak period from Dec. 17 to Jan. 18. Already the diversion process has commenced, as was heard at the meeting of the Bournemouth Gas and Water Company last Friday. While this is the position with regard to gas undertakings, householders are being permitted, whenever they can get the coal, to stock their twelve months' ration. This is another instance of irrational rationing. It is also stated that electrical undertakings are to be placed on the same footing as gas undertakings so far as coal stocks are concerned. We do not say that four weeks' stock is any too much for them; but in view of the fact that they are not limited to coal as a fuel, and that the coal consumed at gas-works is for the purpose not only of providing gas and coke, but explosives, a fertilizer, and much else needed by the nation, the parallel conditions with gas undertakings in regard to the margin of stock is not equitable. Moreover, beyond the difference in the extent of utility derived from the coal, the electricity supply industry has been given the right to supply 800 units of electricity as the equivalent of every ton of household coal displaced in favour of electricity; whereas, on the Coal Controller's own showing, the consumption of coal by electric stations (taking the country through) means an average total destruction of about 1½ tons of fuel to supply 800 units. In other words, an inducement is offered the householder to countenance the extravagant consumption of coal at electricity stations. The position is certainly one calling for the intervention of the Ministry of Munitions. Above all things, the Government ought to safeguard the gas-works undertakings in view of the manifold service which is being performed—service necessary to the war and to the welfare of the country at large. The gas industry at the present time is being treated in respect of its coal stocks as though it was of no more account in the present state of affairs than any other industry, and of less account than the coal cellars of householders and Government offices. One other point regarding the shortage of coal supplies. A correspondent of the "Daily Telegraph," writing from Leeds last week with reference to the strike of the Yorkshire miners stated that had the men been fully aware of the facts concerning the national shortage of coal, they would never have voted for a stoppage. Those responsible for the gas industry and the Ministry of Munitions are perhaps to-day more interested than any other people in the position in connection with the miners; and it would be a good thing (if the miners are so uninformed as to the value of coal in this war) if men with the gift of public speaking connected with the gas industry and the Ministry of Munitions could address some of the mass meetings of miners for the holding of which it is understood arrangements are being made.

Carbonization and Reconstruction—The Policy of "Wait and See."

From the point of view of the gas and coke-oven industries, the final report of the Coal Conservation Committee of the Ministry of Reconstruction is a very disappointing document. Of the constituent reports, that of the Coal Carbonization Sub-Committee is the most featureless and colourless. But the Sub-Committee, to give them their due, have not altogether existed in vain; for, by their intervention, they have shown that the subject of coal conservation is not one that can be dealt with in an off-hand manner, but must be treated in an orderly way and with purposeful resolve, and which orderly way is by complete and competent research—starting from present knowledge and condition of things—such as is being undertaken by the Board of Fuel Research. The Board, in fact, is one of the best products of the existence of this Sub-Committee, through the representations made to the Committee of the Privy Council for Scientific and Industrial Research. It has also been shown that fuel economy is not something which can be dealt with piecemeal, but must be treated as a whole.

It was futile, for example, to suggest (as was done in the report of the Electric Power Sub-Committee) that coal carbonization and chemical products development should be the prelude to, and an integral part of, electricity generation on the large scale. The Board of Fuel Research put their foot down (pending proper inquiry) upon such aspirations and precipitate conclusions from abstract considerations and not substantial and proved facts. And now we have disclosure that it was through conference between Sir George Beilby, the Vice-Chairman of the Carbonization Sub-Committee, and the Vice-Chairman of the Electric Power Sub-Committee, that it was agreed that the introduction of carbonization and gasification processes for the preparation of raw coal as a preliminary to its use for steam-raising is still to be an open question, and that, pending fuller research on all the issues involved, the only practical course to follow in the plan of super-power stations is to leave room in the original lay-out for the introduction of carbonization and gasification plant, should it be subsequently proved that it would be technically and economically advisable to do so. So long as the provision is confined to plans, well and good; that would not cost much. But it must be obvious to the engineering members of the Committee that such a drastic innovation in connection with electric power generation would involve considerable modifications in the design of super-power stations; and therefore it would be better that schemes of reformation, involving some millions of pounds of expenditure, should be deferred until there are brought into exact perspective the lines of best correlative economic advance of all the industries concerned. This is where the Sub-Committees have failed. They have had an independence; and their reports have taken independent courses. Before their publication, they ought to have been considered as a whole by one composite Committee; and the necessary adjustments made so as to have got together a piece of comprehensive and practicable work, the one part of which fitted in with the others. For instance, it may be that the existing carbonization industries may, with their developments, be sufficient for the advancement of the economic interests of the country (with probably supplementary developments to deal with waste and lower grades of materials from the mines), and that through them prepared fuel could be delivered to the electrical

industry. The Coal Carbonization Committee, too, somewhat vaguely alluded to the possibilities of developments of the gas-engine. This is another consideration. But these are merely given as samples of the Electric Power Supply Sub-Committee's shortcomings. They had fixed their ideas on super-stations; beyond them their thoughts and inquiries were immobile.

If any argument were needed to assure the President of the Board of Trade that there is abundant work for a Special Committee to investigate the affairs of the gas industry for the purpose of formulating a new policy under the changed economic conditions, it is to be found in this report of the Carbonization Sub-Committee of the Ministry of Reconstruction. The "reconstruction" needed in the gas industry extends to something much larger than the technical question of carbonization; and this the Carbonization Sub-Committee reserve for the Board of Fuel Research. But caution reigns here. The Sub-Committee "do not think "that any useful purpose would be served by discussing "*here* any suggested reforms and extensions of the gas in-"dustry." We commend this opinion to the President of the Board of Trade. Then again: "In the recently pub-"lished report of the Fuel Research Board, it is pointed "out that the scheme of research which it is proposed to "carry out at the Central Fuel Research Station *may* have "an important bearing on future developments in the gas "industry; and the Sub-Committee concur in that view." It would have been a greater satisfaction if the Sub-Committee could have seen their way to exercise a little less caution, and to let rather more hopefulness break through the words composing these pronouncements. Still further "by this work" [that is, of the Fuel Research Board] "it "is hoped that the way *may* be prepared for the considera-"tion of reconstruction schemes after the war."

If the gas industry really wants to keep abreast of other industries in its preparatory work, it had better at once commence consideration of its position in relation to reformation schemes which are not summed up in carbonization, and not defer "consideration" until after the war. Procrastination has been the bane of the gas industry; and a Committee, of "sub" or any other status, should have much bigger and more advanced ideas than those advocating the projecting of the consideration of everything into the times of peace. The Carbonization Sub-Committee seem to lack courage; and a *non-possumus* attitude is more in keeping with their views. They take refuge in the present conditions under which gas-works are operating. The resources of even the largest and best-equipped works are being strained to the utmost—not only for gas, but for benzene, toluene, naphtha, creosote, and fuel oil, and this in spite of the increasing difficulty of obtaining supplies of coal of pre-war quality. "The energy and forethought of the administra-"tive and technical staffs of these concerns have necesarily "to be concentrated on the immediate problems involved "in the maintenance of output; and the natural course of "improvement and development has in consequence been "seriously checked, if not entirely suspended." Staring in the faces of the members of the Sub-Committee are the reports of various Committees dealing with the electrical industry. In other industries, interest is seething in the preparation of plans for after the war. In some places in the gas industry there seems to be a lack of soul, with ideals ruling of a pigmy order. Even in respect of the one subject of carbonization and the future of gas supply, the report gives no indication whatever as to prospects, or the directions in which it is hoped to find economy and greater efficiency. If anyone seeks light and leading from the report, or any indication of hopefulness, he will find it absolutely barren. To say there is disappointment over it is to put feelings in a mild form.

There are one or two things over which there is gratification. One of these is that the Sub-Committee press upon the Main Committee the importance as a reconstruction question of consideration being given to the continued shipment of first-class coking coal for bunker and other purposes. The available resources of this class of coal are believed to be limited; and so its shipment involves serious waste of national resources. The practice at any rate seriously affects the supplies of coal suitable for carbonization by the gas industry. The other point is that in connection with the more economical utilization of fuel, there must be a greater supply of trained experts. But these, important as they may be, are more or less side issues. The Committee have wholly failed to answer the reference, or to give any indication as to whether it can be answered—viz., "What improvement "can be effected in the present methods of using coal for "the production of power, light, and heat, and to recover "bye-products, with the view to ensure the greatest possible "economy in production, and the most advantageous use "of the coal substance?" The Sub-Committee on Electric Power Supply have advised the Ministry of Reconstruction; the Coal Carbonization Sub-Committee declare the gas industry is too busy to say anything on the subject, and there must be a patient awaiting of the results of investigation by the Board of Fuel Research. Thus the gas industry drifts with closed mouths; while its competitors open theirs widely, and ask for things which, if obtained, would be greatly to their advantage, and, without equal treatment, of considerable disadvantage to the gas industry. Yet another opportunity has been lost.

Gas Managers' Salaries.

GAS managers occupy a position in which they are very much at the mercy of directors or committees in the matter of recompense; and, to the disgrace of the industry, a considerable number of undertakings have chief officers who are ill-paid for the responsibility they have to shoulder. If there was ever a time when good salaries should be paid, it is the present, with all its wear and tear upon officials. In the reconstruction work of the industry, the condition of inadequate salaries is a point that should be looked into; for responsibilities have become greater, and the industry must offer prospects that will attract to it men of brains and high qualifications. Without them, however good the policy framed for the future, there will be little chance of its being universally carried through. Some directors and committee men think that technical qualification only merits something little better than a labourer's wage, which is an excellent certificate of their own want of efficiency for administrative duties, of perspicacity, and of appreciation of what is just. However, there are many engineers and managers who are now labouring with very inadequate salaries; and some of them have had no change made in them, despite the fact that for them, as for the workers under them, the whole costs of existence have undergone substantial change for the worse.

The question is how are the administrators of the concerns that these officials manage to be moved, if they will not respond to the personal appeals of their own managers. The managers cannot afford in these times to quit their service unless they have another and more lucrative position to enter into. The very lowness of their salaries hitherto has stripped them of the ability to make the provision which would give them independence. They are worse off than the men below them, who have fighting organizations and a generous Government acting as a court of appeal, and whose decisions are final, and over-ride those of boards of directors and committees. The technical organizations of the gas industry have no effective power to take up such a matter. It is outside the province of the Institution of Gas Engineers. The Irish Gas Managers' Association in the case of certain members who were willing that an attempt should be made on their behalf, have moved in the matter; but we judge from what the President (Mr. Kirkham) said in his address [*ante*, p. 301], without success. His words were: "Whether the applications have had the desired effect, I "am unable to say." Had they had the "desired effect," the members on whose behalf intervention was made would unquestionably have announced the glad tidings early and freely. Though in Mr. Kirkham's view the question should not be allowed to drop, we are afraid that the intervention of a technical organization of the kind is doomed to failure. Directors and committees will simply throw applications of the kind on one side, with the *sotto voce* inquiry as to what business it is of the organization as to the conditions of employment between themselves and their managers. In most towns, the gas engineer and manager is the only one of his technical species, other than, if the works are large enough, his assistants. He is not in the position of the men with whom it is numbers and manual skill, and not the higher qualifications, that tell. They can co-operate to force their demands; they have unions behind them with funds to maintain them while action is taken in order to compel compliance. They can picket entrances, and use "peaceful "persuasion." The gas manager has nothing of the kind at command. Among electrical engineers there is an organization which has incorporated the powers of a trade union,

Whether it has been of any assistance in bringing about better rates of pay where these are inadequate, we cannot say; but we have our doubts. Anyway, we do not know of any organization that can command or compel considerate treatment for gas managers; and, in our opinion, any attempt to do it through an organization would only result in strained relationships, which would make the position of the ill-paid manager worse than ever.

We are inclined to think that gas engineers and managers are, where low salaries prevail, much to blame for the present position. Primarily, until comparatively recently there has been a dead-set made against directors and committeemen being associated with any of the organized work of the industry. The result of this exclusion is being reaped to-day. We are improperly equipped for anything save commercial work; and in this direction only have representatives of the financial and administrative side of the gas industry gained admission to the general co-operative work of the industry. It is due to the interest that has been engendered by personal touch that there has been the magnificent success there has been in the work of the British Commercial Gas Association. More of this sort of thing in other spheres of the industry's work, and an education would have been gained that would undoubtedly have resulted in a wider appreciation of the value of men who are qualified to take up the responsibilities and duties of gas managers. Another reason why gas engineers and managers are to blame for inadequate salaries, is that they themselves have appraised their own value at too low a point, and have pandered to the parsimonious spirit that largely pervades and controls some boards of directors and gas committees. Had there not been qualified men who were quite willing to accept office at a low salary, there would have been less heard now as to inadequate salaries; for niggardly boards and committees would then only have been able to get unqualified men at low remuneration, and these they would have been glad enough to get rid of when they found out that want of qualification and low salary had put their undertaking on the high road to disaster. As things are in the gas industry, we see nothing for it but individual action to obtain increased salary, till there is established and fully recognized some sufficient test of qualification, and for those who pass the test to refuse to accept office at salaries below a definite scale based upon output. Such a scale now would have to be pitched higher than it would have been before the war. Responsibilities and duties have grown out of all semblance with those of the past; and the war has raised, and will continue to affect for some time to come, the costs of existence and the obligations of every one of us.

The Industry's New Financial Conditions.

The intimation of the President of the Board of Trade (Sir Albert Stanley) that after the war there will have to be some revision of the financial terms and conditions on which statutory undertakings operate, in order to co-ordinate the terms and conditions with new circumstances, which have a habit of creating themselves without troubling about Governments and Acts of Parliament, is a matter that has naturally attracted Mr. William Cash, F.C.A., the Chairman of the Bournemouth Gas and Water Company. Mr. Cash, in his professional work, largely lives among the statistics of the gas industry; and, therefore, what he has to say on this subject has to be noted, and treated with respect. In his speech to the proprietors of the Company last Friday, he pointed out, in connection with Sir Albert's hint, that capital after the war will be scarce, that there will be keen competition for available capital, and that capital will require increased remuneration just as labour does; and, therefore, the question of revision will need very great care in connection with gas undertakings. It is not only a question of capital, but of the terms in respect of charges, standard and maximum prices, and so forth, that will have to be considered and dealt with; for the old values for money, materials, and labour are now defunct, and new standards will rule hereafter that will have no resemblance to those that existed at the time the old terms and conditions were statutorily cast for the gas industry. With external conditions changed, it would simply mean destruction for the industry to stick in the mud with the old conditions. Therefore, the need for thorough preparation betimes, so as not to find the industry suddenly plunged into the vortex of discussion over financial revision without the necessary preparation. Mr. Cash mentions that revision will require "very great care;" and such care cannot be given at a moment's notice. Patient, extensive, and comprehensive inquiry is necessary. This being so, we can quite appreciate what Mr. Cash means when he says that "constant" revision of the terms and conditions on which gas undertakings work would have a disturbing influence. By no stretch of the imagination can it be said that the industry has been subjected to constant revision. That there has not been revision before is just what the industry is suffering from at the present time.

A Lively Week in Respect of Coal.

The week has been a lively one in connection with coal. The seriousness of the outlook as to supplies has been impressed on the nation; and we fear the worst has not been told. The work of bringing miners of low medical category out of the army, and returning them to the mines has commenced, while the miners themselves fear that these men, being of low medical category, will not be able to withstand the strain of working in the mines under intensified conditions. In connection with the question of domestic coal economy, a Committee have been gravely listening to the resurrection of old ideas as to how the domestic grate can be made a little less voracious—one of them being the greater use of fireclay bricks for reducing the dimensions of the grates, which bricks are unobtainable in large quantities! There has been a day's strike of about 100,000 Yorkshire miners, and a day's output lost—this all over the question of whether or not Judge Benson's award decreeing a fifty-four hour week for shopmen included meal hours. An agreement was arrived at, on the strength of which the miners returned to work; but the reduction of output is to be deplored. The means of augmenting output has been under continuous consideration. The Miners' Federation agreed to the appointment of Joint Pit Committees to do all possible to stop avoidable absenteeism. Mass meetings of the men are also to be held with the view of inducing them to increase output. On the other hand, at the meeting of the Miners' Federation, a feeling of disappointment was prevalent over the poverty of ideas and want of courage on the part of those in authority. The question of the appreciation in the value of colliery and other shares was also raised. It was urged that the Government should stop this exploiting of the public for profit; otherwise they were not likely to get a willing response from the miners to the appeal for a larger output.

Miners' Views as to Wages.

The question of the appointment of a National Wages Board has been discussed by a special conference of representatives of the coal-mining districts of England and North Wales. In view of the fact that the coal industry is now under control, and that a National Wages Board could not be set up at the present time, it was decided to enter into negotiations with the employers for a renewal of the Coal Conciliation Board for the duration of the war and six months after, subject to the acceptance of certain proposals. These are that six shifts be paid for five to all workmen on the afternoon or night shifts, with the proviso that wages equal to the wages payable for one and one-fifth shift shall be paid in respect of each shift worked; also that the existing war bonus of 18 p.ct. calculated on the present rates be merged in the existing wages, and be the basis of future agreement, and that there shall be no maximum wage in the agreement. The miners are not by any means slow or shy where their own recompense is concerned. While they may be profiteers from the war, others may not be. Profiteering from the war in any quarter is to be deplored; but the miners should apply their own principles at home before they act as critics of others.

Rationing and the Current Quarter.

The Manchester District Institution of Gas Engineers are endeavouring, as witness a report in a later column, to move the Coal Controller to except the current quarter from the operation of the Fuel and Lighting Order, on the ground that the local machinery not having been completed, and certificates issued by Local Fuel Overseers, consumers are proceeding to use gas and electricity precisely according to requirements—some beyond the normal, with the view to husbanding coal for the winter months. It would only be fair that this should be done. But we fear there is little chance. The Rt. Hon. Sir Daniel F. Goddard raised this

very point in the House of Commons recently; and Sir Albert Stanley, the President of the Board of Trade, stated that the operation of the Order from July 1 must be persisted in and not deferred. Thus whatever householders are doing this quarter (of which about two-thirds have now passed, and yet no certificates in numerous places) will be debited against the twelve months' allowance of fuel. In other words, householders, who have—not wilfully, but ignorantly—been consuming quantities of gas and electricity according to need, but in excess of the quarter's proportion of their allowance, will find themselves punished for the belated issue of proper instructions by the machinery set up to give effect to the Order. This will be a great hardship. On the other hand, there are districts in which, at any rate, a portion of the certificates have been issued, and any change now would upset the work that has been done in these quarters, though this is no vindication of injustice being inflicted elsewhere through arrears over which householders have had no control. Officially, it is "hoped and believed" that the rationing will be completed by the end of September.

First Working Experiences.

To a short article in the "Daily Telegraph" there is a sub-heading—"Scheme Working Well." But in the opening lines there is confirmation of the experiences in the Manchester district. It is stated that the first week's fuel and light rationing in London under the new Order shows there is, on the part of the public, a general tendency to take the same amount of gas and electricity as in the past, and to economize by reducing the tonnage of coal or by taking a proportion of coke. The experience is said to be based on observations made in some fifty Metropolitan districts. In the "JOURNAL" there has been criticism of the complexity of the scheme; but, according to the report in our morning contemporary, it would appear that these criticisms are officially regarded as being without substantiation, which is an assurance that those who hold this opinion have at the present stage been favoured with filled-in forms and requisitions from the most intelligent part of the community. The fear as to mess and muddle ensuing from the complexity of the forms is said to be altogether groundless. Several hundred forms a day are being received in various Metropolitan districts. Intelligence is generally shown in their filling-up, and the percentage of adjustment is asserted to be no greater than was anticipated. One of the other points to which we have referred is as to how householders are to make a return in regard to the amount of coal in stock, in order that the certificate may be for the net amount to be delivered. The householder is now informed—and the information will exercise a good many—that it will be an aid to making a return if he keeps in mind that the space occupied by a ton of coal stacked is from 45 to 50 cubic feet. In the case of the layman, will this be an aid? The Coal Controller's scheme is evidently intended to be not only a rationing but an educational one.

Coal and Coke Exports.

Compared with immediately preceding months, the coal, coke and patent fuel exports are beginning to show the effect of the increased supplies now being delivered to our Allies (about ½ million more tons were exported in July than in June), though in comparison with the corresponding month of war years, the quantities are still short. The amount shipped last month was 3,044,174 tons, which is a reduction of 529,963 tons on July, 1916, and of 351,191 tons on July, 1917. The values of the exports were: July, 1916, £4,824,952; July, 1917, £4,600,344; and July, 1918, £4,658,878. The average value per ton last month was £1 10s. 7¼d., compared with £1 7s. 1d. in July, 1917. For the seven months of the year, a total of 19,597,392 tons has been shipped, or 4,481,432 tons less than in the corresponding period of 1916, and 58,534 tons less than for the corresponding period of 1917. The values for the seven months were: In 1916, £28,128,113; 1917, £30,462,891; and 1918, £28,161,691.

OBITUARY.

The death has occurred of Mr. RICHARD YOUNG, Vice-Chairman of the Shanklin Gas Company, and Director of the Sandown Gas Company. He was 82 years of age, and right up to the time of his death was actively associated with the public and private business affairs of Shanklin.

PERSONAL.

Mr. F. G. AMBLER, who was recently appointed Technical Assistant at Nelson, has been promoted by the Nelson Gas Committee to the position of Superintendent of the Brierfield Gas-Works of the Corporation.

Mr. ARTHUR A. LEONARD, Assistant to Mr. William H. Ely, Engineer and Manager of the Woking District Gas Company, has been appointed to a similar position under Mr. A. W. Sumner, Engineer and Manager of the Grays and Tilbury Gas Company.

Mr. T. A. CLARE, until recently with Messrs. Aldridge and Ranken, and now Chief Draughtsman to the Brentford Gas Company, has gained the first prize in Grade 1 for "Gas Engineering," and has also been awarded the City and Guilds of London Institute bronze medal.

The good wishes of a very wide circle of friends in the industry with which he has for so many years been associated will go with Mr. R. J. LUKEY, the Secretary to the Australian Gaslight Company, of Sydney, into his well-earned retirement. Though he has passed thirty years of his business life in Australia, Mr. Lukey is well known on this side; and another visit from him, in calmer times, will be looked forward to. He was granted extended leave of absence from the beginning of this month; and will cease his connection with the Company on May 1 next year.

It was stated last week that the 43 applications for the position of Engineer and Manager to the Accrington District Gas and Water Board had been reduced to seven; and since that paragraph was penned, the final selection has fallen upon Mr. A. J. HARRISON, the Manager of the Padiham Gas-Works. Though the surname of the new Engineer for Accrington is the same as that of his predecessor, Mr. Charles Harrison, there was no relationship between them. Mr. A. J. Harrison is connected with a family the members of which have been in the gas industry for practically a century; and he has now about twelve relatives managing gas undertakings. He received his training in the Droitwich Gas-Works, and from there went to Sileby, in Leicestershire, where he started a new gas-works. Afterwards he was at Brigg, where he had charge of the gas and water works and sewage pumping station. He has been Manager at Padiham for twelve years, and during that time has re-organized the undertaking; the works having been entirely re-built on a new site.

Weights of Various Coals.

In Technical Paper No. 184 of the United States Bureau of Mines, a copy of which has just been received, Mr. S. B. Flagg deals with differences in weight of various kinds of coals. Many sorts of coal have been tested and analyzed by the Bureau, in the course of investigations relating to the purchase and use of fuel by the Government and to safety in coal mining; and advantage has been taken of the opportunity thus afforded to obtain information as to differences in weight. Mr. Flagg says probably most people know that different coals vary somewhat in weight; but there seem to be little available data as to the range of variation. Factors other than variation in specific gravity affect the weight of a cubic foot of delivered or stored coal. Among these are the quantity of surface moisture, the proportions of coarse and fine coal, and the amount of shaking or settling. Observations of the changes in weight and volume of a Westmorland bituminous coal from wetting and from shaking or settling, seem to justify the following conclusions: Of two samples of any coal that are composed of the same proportions of pieces of different sizes, the sample having the higher moisture content will usually weigh the more per cubic foot. The sample of higher moisture content will usually occupy more space for the same number of pounds of (dry) coal than will a sample of lower moisture content. However, the increase in volume for the wet coal is not as great proportionately as is the increase in weight per cubic foot. Coal shovelled loosely into a container will settle appreciably if the container is shaken; and the weight per cubic foot will be correspondingly increased. Slack coal composed of a mixture of the smaller pieces up to, and including, nut size weighs more than screened nut coal. There is in the paper a table showing the weight per cubic foot of 177 samples of coals from mines in different States and certain other countries; the weights being determined by shovelling coal loosely into a box measuring 2 ft. × 2 ft. × 2 ft., and levelling-off with a straight-edge. A study of the table, it is pointed out, clearly indicates that heavier weights may be expected for coals of high fixed carbon content than for those of low. Increased ash content seems to lower the unit weight. It is also true, in general, that the coals high in moisture are lighter than those low in moisture, and the younger coals are lighter than the older coals. These variables combine in so many ways, however, that it is difficult to determine from the data available anything more than a general trend; and consequently little use can be made of the knowledge of a change of one or more of the variables.

The late Mr. E. Herbert Stevenson, of No. 38, Parliament Street, S.W., left estate of the value of £4438. Mr. John Robert Pickering, of Leeds, a member of the firm of Messrs. Clayton, Son, & Co., of Hunslet, left estate of the gross value of £20,157.

COMPARATIVE WORKING RESULTS OF TWO OF THE METROPOLITAN AND THREE OF THE SUBURBAN GAS COMPANIES.

IN THE HALF YEAR ENDED JUNE 30, 1918.

Compiled by Mr. F. J. BRADFIELD, the Secretary of the Commercial Gas Company.

	South Metropolitan.	Commercial.	Wandsworth.	South Suburban.	Tottenham.
Gas sold . . . . . thousands	6,863,847	1,829,354	1,367,814	1,398,849	1,208,997
Increase . . . . . per cent.	Dec. 8·25	Dec. 4·35	Dec. 3·47	3·12	Dec. 7·99
Gas made per ton of coal carbonized . . . . . cubic feet	11,942	13,037	12,276	11,569	12,444
Gas unaccounted for . . . . . per cent.	3·27	6·54	8·82	7·10	6·03
Coke made for sale per ton of coal . . . . . cwt.	9·90	11·21	10·97	8·07	7·36
Tar made per ton of coal . . . . . galls.	9·08	10·25	7·91	..	9·49
Liquor made per ton of coal . . . . . galls, 8 oz.	39·72	38·32	35·00	37·26	30·99
Percentage of coke used as fuel	19·60	13·75	12·28	32·38	39·70
Capital expended per 1000 cubic feet sold during the past year	s. d. 8 4·43	s. d. 8 4·95	s. d. 7 5·93	s. d. 8 0·70	s. d. 9 7·06
Price charged per 1000 cubic feet	3/7	3/6	3/1 to 4/1	3/6 to 4/8	3/4 and 3/9
Costs per 1000 Cubic Feet of Gas Sold.					
REVENUE ACCOUNTS.	d.	d.	d.	d.	d.
Coals, oil, &c.	34·85	32·72	33·06	31·19	26·52
Less residuals—Coke and breeze	12·69	10·42	10·18	8·42	7·59
Tar	3·26	2·73	2·77	1·49	1·95
Amm. liq. and sulph. amm.	3·08	2·29	1·83	2·29	1·48
Total residuals	19·03	15·44	14·78	12·20	11·02
Net for coals, oil, &c.	15·82	17·28	18·28	18·99	15·50
MANUFACTURE—					
Salaries	·85	·59	·49	·68	·32
Wages—carbonizing	3·03	2·51	3·37	2·56	2·65
Purification	·81	·26	·73	·72	·48
Repairs—plant	7·92	5·56	7·05	5·20	8·26
Net manufacture	28·43	26·20	29·92	28·15	27·21
DISTRIBUTION—					
Wages and salaries	1·10	1·14	1·85	1·47	·83
Repairs—Mains and services, &c.	1·39	1·38	1·32	1·87	1·60
" Meters and prep. meters and fittings	2·12	2·31	1·01	2·24	2·20
" Stoves—ordinary and prepayment	·99	1·79	1·34	1·34	·89
Total net manufacture and distribution	34·03	32·82	35·44	35·07	32·73
Public lamps—lighting and repairing	·73	·51	·66	·63	·11
Rents, rates, and taxes	2·62	1·92	1·26	1·96	·97*a*
MANAGEMENT—					
Directors, Auditors, and salaries (Secretary, &c.)	·32	·38	·54	·68	·47
Collectors.	·98	1·24	·75	·67	·52
Stationery and general charges	·67	·54	·65	·41	·65
Profit-sharing	..	·02	·04	·14	..
Bad debts	·03	·03	·05	·01	·03
Law and parliamentary charges	·03	·06	·04	·21	·02
Superannuations, &c.	·64	·36	·26	·48	·55
National Insurance	·11	·08	·08	·06	·06
Active service allowances	·25	·47	·33	·33	4·15*b*
Sundries	·05	·02	·02	..	..
Total expenditure (*less* residuals)	40·46	38·45	40·12	40·65	40·26
GAS	41·21	39·40	40·65	42·36	39·87
Rentals—Meters and prep. meters and fittings	2·95	3·06	2·69	2·15	1·96
Stove	1·28	1·89	2·53	1·85	3·98
Incand. mantle maintenance	..	·10	·14	..	·03
Miscellaneous	·05	·00	·06	·05	·14
Total—Gas, rentals, &c.	45·49	44·45	46·07	46·41	45·98
Balance, being profit	5·03	6·00	5·95	5·76	5·72
Dividend and interest	5·84	6·76	6·11	5·00	8·85*c*
Surplus or deficit	Def. ·81	Def. ·76	Def. ·16	·76	Def. ·13
Contributions to funds and sundry payments	..	..	..	..	..
SUNDRIES.	s. d.	s. d.	s. d.	s. d.	s. d.
Coals cost per ton	33 0·39	36 4·80	36 8·25	..	28 9·30
Coke realized per ton of coal	11 11·52	14 1·25	11 8·27	9 5·77	9 5·74
Coke " " of coke	24 1·87	25 1·90	21 3·85	23 5·87	25 9·11
Breeze " per ton	1 3·80	1 0·67	1 8·61	5 2·84	1 6·97
Tar realized per gallon	0 4·09	0 4·18	0 4·48	0 2·17	0 3·15
Amm. liquor, &c., realized per butt (8 oz.)	7 11·34	8 9·31	6 7·39	7 7·13	6 6·55
Percentage of stoves at rental to consumers	103	77	99	112	70
Bad debts per cent. on total receipts	·04	·06	0·8	·02	·05
Net profit per cent. on ordinary capital	2·49	2·88	4·41	4·51	4·12
One penny variation equals in half year	£28,599	£7622	£5699	£5829	£5037
Water gas, per cent. on total make	..	26·52	21·83	22·82	24·77

a Rent and Rates only.
b Including 3·69d. for War Wage.
c Including 0·97d Income-Tax item.

COMPARATIVE WORKING RESULTS OF TWO OF THE METROPOLITAN AND THREE OF THE SUBURBAN GAS COMPANIES.

TABLE SHOWING THE VARIATION, INCREASE OR DECREASE, ON FIGURES OF CORRESPONDING HALF YEAR, 1917.

[The figures in heavy type show the decreases.]

Compiled by Mr. F. J. BRADFIELD, the Secretary of the Commercial Gas Company.

		South Metropolitan.	Commercial.	Wandsworth.	South Suburban.	Tottenham.
Gas sold	thousands	**617,133**	**83,225**	**49,199**	42,318	**105,026**
Increase (variation equal to)	per cent.	**20·34**	**12·40**	**13·21**	**13·98**	**8·02**
Gas made per ton of coal carbonized	cubic feet	**556**	**708**	**418**	**431**	**204**
Gas unaccounted for	per cent.	**1·01**	**1·44**	3·73	**1·22**	**·90**
Coke made for sale per ton of coal	cwt.	**·24**	**·08**	·30	**·75**	**1·13**
Tar made per ton of coal	galls.	**·59**	**·28**	**·67**	..	**·73**
Liquor made per ton of coal	galls, 8 oz.	**1·00**	3·06	7·23	4·62	**1·14**
Percentage of coke used as fuel		**2·19**	**·62**	**2·37**	**2·97**	**9·85**
		s. d.	s. d.	s. d.	s. d.	s. d.
Capital expended per 1000 cubic feet sold during the past year		**0 1·83**	**0 0·35**	**0 0·92**	**0 8·27**	**0 6·22**
Price charged per 1000 cubic feet†		**0 11·00**	**0 10·00**	**1 1·00**	**0 8·00**	**0 8·00**
Costs per 1000 Cubic Feet of Gas Sold.						
REVENUE ACCOUNTS.		d.	d.	d.	d.	d.
Coals, oil, &c.		**6·76**	**5·79**	**5·28**	**1·83**	**·79**
Less residuals—Coke and breeze		**·72**	**1·19**	**·60**	**·90**	**1·34**
Tar		**·44**	**·86**	**·47**	**·09**	**·79**
Amm. liq. and sulph. amm.		**·08**	**·06**	**·25**	**·25**	**·80**
Total residuals		**1·24**	**1·99**	**·12**	**·56**	**2·93**
Net for coals, oil, &c.		**5·52**	**3·80**	**5·16**	**2·39**	**2·14**
MANUFACTURE—						
Salaries		**·15**	**·09**	**·11**	**·16**	**·05**
Wages—carbonizing		**1·15**	**·71**	**1·20**	**·98**	**·31**
Purification		**·33**	**·01**	**·53**	**·14**	**·16**
Repairs—plant		**3·87**	**1·88**	**2·90**	**1·57**	**3·90**
Net manufacture		**11·02**	**6·49**	**9·90**	**5·24**	**2·28**
DISTRIBUTION—						
Wages and salaries		**·32**	**·24**	**·68**	**·16**	**·06**
Repairs—Mains and services, &c.		**·16**	**·16**	**·12**	**·48**	**·22**
,, Meters and prep. meters and fittings		**·46**	**·36**	**·39**	**·68**	**·50**
,, Stoves—ordinary and prepayment		**·08**	**·18**	**·18**	**·11**	**·18**
Total net manufacture and distribution		**11·88**	**7·43**	**11·03**	**6·67**	**2·44**
Public lamps—lighting and repairing		**·27**	**·07**	**·23**	**·17**	**·01**
Rents, rates, and taxes		**·10**	**·27**	**·18**	**·18**	**·20**
MANAGEMENT—						
Directors, Auditors, and salaries (Secretary, &c.)		**·10**	**·06**	**·04**	**·01**	**·05**
Collectors		**·36**	**·27**	**·33**	**·19**	**·03**
Stationery and general charges		**·14**	**·03**	**·11**	**·10**	**·23**
Profit-sharing		**·47**	**·29**	**·24**	**·08**	**·09**
Bad debts		**·00**	**·00**	**·01**	**·02**	**·01**
Law and parliamentary charges		**·01**	**·05**	**·01**	**·14**	**·05**
Superannuations, &c.		**·19**	**·02**	**·05**	**·11**	**·14**
National Insurance		**·02**	**·00**	**·00**	**·00**	**·02**
Active Service allowances		**3·09***	**·02**	**2·95***	**2·20***	**2·59**
Sundries		**·01**	**·01**	**·00**	..	..
Total expenditure (*less* residuals)		**9·48**	**7·34**	**8·68**	**5·27**	**5·16**
GAS		**9·43**	**7·64**	**10·49**	**5·42**	**5·05**
Rentals—Meters and prep. meters and fittings		**·41**	**·38**	**·10**	**·15**	**·16**
Stove		**·03**	**·08**	**·17**	**·08**	**·10**
Incand. mantle maintenance		..	**·00**	**·02**	..	**·00**
Miscellaneous		**·00**	**·00**	**·05**	**·02**	**·07**
Total—Gas, rentals, &c.		**8·99**	**8·10**	**10·83**	**5·67**	**5·18**
Balance, being profit		**·49**	**·76**	**2·15**	**·40**	**·02**
Dividend and interest		**·82**	**·42**	**·06**	**1·24**	**·80**
Surplus (variation equal to)		**·33**	**1·18**	**2·09**	**1·64**	**·78**
Contributions to funds and sundry payments		..	..	..	..	..
SUNDRIES.		s. d.	s. d.	s. d.	s. d.	s. d.
Coals cost per ton		**4 10·77**	**8 5·25**	**9 2·57**	..	**2 0·15**
Coke realized per ton of coal		**0 2·55**	**1 1·82**	**0 2·87**	**0 10·29**	**0 0·00**
Coke ,, ,, of coke		**0 11·77**	**2 2·63**	**1 0·47**	**0 0·67**	**3 5·03**
Breeze ,, per ton		**2 7·59**	**1 11·64**	**4 5·69**	..	**1 0·31**
Tar realized per gallon		**0 0·59**	**0 1·42**	**0 1·31**	**0 0·29**	**0 1·01**
Amm. liquor, &c., realized per butt, 8 oz.		**0 0·20**	**1 5·78**	**0 8·41**	**·53**	..
Percentage of stoves at rental to consumers		**1**	**1**	**2**	**4**	**2**
Bad debts per cent. on total receipts		**·02**	**·01**	**·03**	**·03**	**·02**
Net profit per cent. on ordinary capital		**1·11**	**·08**	**1·73**	**·53**	**·74**
One penny variation equals in half year		**£2572**	**£347**	**£205**	**£177**	**£438**
Water gas per cent. on total make		..	**·78**	**5·10**	**2·23**	**12·00**

† These figures show the variation in price in the Companies' principal areas. * 1917 figures include war bonus.

GAS-WORKS MACHINERY AND DEDUCTIONS FOR WEAR AND TEAR.

The modern gas-works contains a considerable quantity of mechanically operated plant in its organism; and this makes considerable differences in the fluctuations of the item of repairs and maintenance of works and plant. According to some remarks by the Rt. Hon. Sir Daniel F. Goddard, M.P., at the meeting of the Bournemouth Gas Company last Friday [p. 406], he anticipates that the item will receive considerable relief if use is made of a provision which appears in the Finance Act of this session It is clause 24, is side-headed "Provision with Respect to Deductions for Wear and Tear of Plant," and reads as follows:

(1) Where an application is made to the Commissioners of Inland Revenue for the alteration of the amount of any deduction for wear and tear, the Commissioners, unless they are of opinion that the application is frivolous or vexatious, shall refer the case to the Board of Referees, and that Board shall, if they are satisfied that the application is made by, or on behalf of, any considerable number of persons engaged in any class of trade or business, take the application into their consideration, and determine the deduction to be allowed.

In this section—

The expression "deduction for wear and tear" has the same meaning as in section 26 of the Finance Act, 1907; and

The expression "Board of Referees" means any Board of Referees appointed for the purpose of Part III. of the Finance (No. 2) Act, 1915, or, if there is no such Board, a Board of Referees to be appointed for the purpose of this section by the Treasury.

(2) Section 12 of the Customs and Inland Revenue Act, 1878, as amended by section 26 of the Finance Act, 1907, shall have effect as if the references therein to diminished value by reason of wear and tear during the year of any machinery or plant included references to diminished value by reason of any machinery or plant having been temporarily out of use at any time during the year through circumstances attributable, directly or indirectly, to the present war.

(3) In estimating the profits or gains of any trade, manufacture, adventure, or concern in the nature of trade chargeable under Schedule D, or the profits of any concern chargeable by reference to the rules of that schedule, there shall be allowed to be deducted as expenses incurred in any year so much of any amount expended in that year in replacing any plant or machinery which has become obsolete as is equivalent to the cost of the plant or machinery replaced after deducting from that cost the total amount of any allowances which have at any time been made in estimating profits or gains as aforesaid on account of the wear and tear of that plant and machinery, and any sum realized by the sale of that machinery or plant.

(4) Section 9 of the Finance Act, 1898 (which relates to the amount of the deduction to be allowed on account of the annual value of premises), shall not apply in the case of any premises being mills, factories, or other similar premises.

It will be observed that applications for the alteration of the amount of deductions for wear and tear have to be made by, or on behalf of, "any considerable number of persons engaged in any trade or business," and that under subsection 3 "there shall be allowed to be deducted as expenses incurred in any year, so much of any amount expended in that year in replacing any plant or machinery which has become obsolete as is equivalent to the cost of the plant or machinery replaced," after making the deductions named.

Several Departmental Committees who have been considering the question of *post*-war conditions have arrived at the conclusion that the allowances made by the income-tax authorities are too low; and particularly so when plant is operated, as it is being now, at high pressure. The competence of the Inland Revenue Authorities to deal with such a far-reaching matter as depreciation and wasting assets under all sorts and conditions of service in totally dissimilar industries, has been questioned; and therefore welcome is given to the transfer from the Commissioners to a Board of Referees (with a constitution on a broad basis) specially qualified for dealing with allowances of depreciation for income-tax purposes. The importance of an adequate allowance for the depreciation of plant cannot be overstated; and perhaps now greater satisfaction will be realized.

The matter is the subject of a Memorandum that has been lately issued by the Board of Inland Revenue. This deals with the history and present position of the matter. Section 12 of the Customs and Inland Revenue Act, 1878, authorizes a deduction in the assessment of profits of such an amount as the Income-Tax Commissioners "may think just and reasonable as representing the diminished value by reason of wear and tear during the year of any machinery or plant used for the purposes of the concern." This deduction is in addition to the allowance made in respect of the cost of repairs. There is no statutory limit to the amount which the Commissioners may allow in any year; but the aggregate amount of the deductions from first to last must not exceed the actual cost of the machinery and plant to the person by whom the concern is carried on. The assessment on the profits of a trader for a particular tax year may be *nil*, or less than the amount of the wear and tear allowance for that year, so that he cannot get the full deduction from that year's assessment to which he would otherwise have been entitled. In such a case that part of the allowance to which effect cannot be given is carried forward and added to the allowance for the next year, and so on for succeeding years.

Although no fixed scale of allowance is prescribed by law, definite rates of depreciation on different classes of machinery have been agreed upon for uniform application in a number of important industries, as the result of applications by representatives of the industries to the Board of Inland Revenue. Though these allowances have been generally adopted and accepted by the taxpayers, the power to appeal to the Board of Referees from the Commissioners, which is given by section 24 of the Finance Act, 1918 [as quoted above], will not be affected by the agreement. Application in such a case has first to be made to the Commissioners of Inland Revenue; and they will send the case on to the Board of Referees.

In addition to the allowance for wear and tear of plant and machinery, there has been in operation since 1897 an allowance for obsolescence; and this allowance has been made statutory by section 24 of the Finance Act, 1918. Accordingly, where any new machinery is introduced in place of machinery not wholly worn out, an allowance is made as a deduction from the profits of the year, of so much of the cost of replacement as is equivalent to the written-down value of the machinery replaced, less any sum realized by the sale of it; the balance of the cost of the new machinery being an addition to the capital of the business.

As an alternative to the allowance for wear and tear and obsolescence of plant and machinery, the cost of renewing plant and machinery may be claimed as a deduction in the computation of income-tax liability under Schedule "D." When this course is preferred, the amount to be allowed is the actual cost of the new plant and machinery (excluding any part of the cost which is attributable to additions or improvements—*i.e.*, to an increase in capital) after deducting the scrap value or realized price of the plant and machinery replaced. Although this method of allowance is alternative to the wear and tear allowance for the same class of plant, the two principles may run concurrently for different classes of assets in the same business. For example, the wear and tear allowance may apply to fixed machinery, while the renewal method is used for loose plant.

In the computation of the profits of his business for assessment under Schedule "D," a trader is allowed to deduct as a trade expense his whole outlay on repairs, maintenance, and insurance of his trade premises.

Cases have arisen, especially since the commencement of the war, in which machinery is suffering exceptional wear and tear, owing, for example, to extra hours of running, the difficulty of obtaining material for effecting repairs, the rougher usage to which the machinery is subjected due to the employment of unskilled labour, and the fewer opportunities available for having the machinery overhauled. In such cases applications for special rates of depreciation have been entertained; but, generally speaking, the circumstances of individual cases have been found to vary so widely as to render it impracticable to fix a uniform scale, and each application has been dealt with on its own merits.

Where machinery or plant has been temporarily out of use through circumstances attributable directly or indirectly to the present war, an allowance for depreciation is granted on the same lines as if the diminished value had actually been caused by wear and tear during the year.

ELECTRICITY SUPPLY MEMORANDA.

For the electrician, there is a good deal at the British Scientific Products Exhibition at King's College of the smaller order of electrical appliances that will interest him—showing that there has been a great shaking of the dry bones of the British electricity manufacturing industry during the war, and that the new liveliness has been the means of making this country in many respects free from electrical dependence upon Germany. But in view of the largeness and variety of the trade that Germany did in pre-war days in exporting to this country its electrical productions, British manufacturers will have to build and create extensively, in order to satisfy home demands and take larger part in export business subsequent to the war, so as to keep the wily German bagman from recommencing the large stream of orders to the land over which the "All Highest" rules. The electrical factories and businesses here, too, were largely leavened and financed by Germany prior to the war; and the Teutonic policy of doing the utmost for the Fatherland was obeyed by its resident agents in this country with almost fanatical fervour. Whether the electrical businesses here have been drained clean of German influence and capital, we do not know. We hope so. Whether electrical engineers will again play into the hands of the German penetrationists cannot be said. We hope they will not. Whether among electrical men patriotism will ride superior to a German-made seductive cheapness for the purpose of regaining trade, is a matter for them. We hope that it will, and that the electrical industry in this country will henceforth be able to boast that it is not doing anything towards rehabilitating the prosperity of Germany. The exhibition shows that, given the opportunity, British manufacturers, aided by scientists and skilled workers, can do all that is needful to comply with electrical requirements. Professor R. A. Gregory reminds us that in the report of the Departmental Committee on Electrical Trades, it is shown that before the war the approximate annual value of the total product of electrical plant, mains, and appliances in Germany was more than treble that of Great Britain, and the annual value of home-

The Home Electrical Industry and Germany.

made electric machinery used per hundred people was more than double that consumed in this country.

Notable Events in Electrical Progress.

Prefacing the catalogue of the exhibits at King's College, there are a number of short articles lightly sketching some of the war work that has been accomplished in order to fill the yawning gaps in this country's supplies owing to Germany finding certain obstacles in its path which have caused an interruption of business relations. The writer of the one on "Electrical Plant and Appliances" is Mr. W. R. Cooper, the Editor of the "Electrician." He has experienced difficulty in finding material specially of a wartime born character. He refers to the tungsten filament lamp, and to the falsely named "half-watt" lamp, with its fearfully high intrinsic brilliancy. These are not wartime developments; but in connection with them, he makes the interesting note that, whereas the export from this country of tungsten wire for lamp filaments was before the war comparatively small, one firm alone is now exporting 600,000 to 700,000 metres of tungsten wire per week to foreign markets which would otherwise be taking supplies from Germany. Then the remarkable advance of the Parsons steam-turbine is brought to notice, as well as its effect in cheapening power, which has had reflection in the greater use of the electric-motor. The Parsons steam-turbine is not a war product; but Mr. Cooper claims that, had it not been for the electric-motor, the output of munitions in this country would never have reached its present enormous scale. The progress of railway electrification, of electric vehicles, of wireless telegraphy, and of electro-chemistry is referred to; but our recollection of these matters antecedes the war. We admit that the synthetic methods of producing nitrogen compounds have received a tremendous fillip during the war, especially in Germany, where, through the force of circumstances, self-reliance has become the order of the day. There is the electric-furnace, in connection with which the writer alludes to "stalloy"—an alloy due to Sir Robert Hadfield, Bart., which is remarkable for its low electrical losses. "The reduction in losses by the use of this alloy in transformers for electric power has probably effected a saving of some ten million pounds sterling per annum; and this saving is continually increasing." However, what has been done by this country during the war in the production of magnetos and arc lamp carbons receives proper recognition; and the progress that has been made, though as yet short of need, in the production of glass bulbs for glow lamps, and of insulation and resistance wires, and of electro-medical apparatus, is duly noted. There is one thing we miss; it must be an oversight on Mr. Cooper's part. There is nothing about domestic electric heating; and the progress of cost for this purpose—(say) 2d. and 2¼d. per 3420 B.Th.U. delivered to the "radiators," though the useful effect obtained is not a 100 p.ct. one, but one that varies with different designs of radiator. Nor is anything mentioned as to electric-cookers, and the fact that, by deliberately using lower temperatures in the oven and higher ones in the gas-oven, there is a difference in the shrinkage of meat in favour of the former. Mr. Cooper ought to be called over the coals, or rather the electric elements, for this omission. Furthermore, we do not see that "progress" is recorded in heating water by electricity. The fact, however, that these matters are not included shows that truth still exists in the adage that "discretion is the better part of valour."

World's Development of Electrical Apparatus.

"It's an ill-wind that blows nobody good." In most countries the electrical manufacturers have been increasing their revenues during the war—in belligerent countries by the increased home demands, in America and Japan by home requirements and exports, and in most neutral countries by exports—save perhaps Switzerland, where there has been difficulty in getting materials. The German electrical industry, which had before the war been worked up to high-water mark for the purpose of serving not only home needs but the overseas markets, will find that many of its old places of absorption will in future be amply satisfied by home produce, and, in fact, some of the former purchasers will now themselves have so much to spare that they will be competing with Germany, and with unsullied reputations, in the world markets. A long but enlightening article on the subject (reproduced by the "Electrical Review") has been published in the "Bulletin of the Association of Swiss Electrical Engineers." From it we learn that the Allgemeine Electricitäts Gesellschaft have not been making quite so much profit, but they have been executing considerable work for electrical machinery and plant required by the German military authorities. Other electrical works in Germany as well as in other belligerent countries have been similarly engaged. The chief three electrical companies in America have been counting their increased output in millions of dollars, although only 7 p.ct. of the output was for export. The value of the exports from the United States during 1916 exceeded to the extent of 43 p.ct. the already fine figures of 1913. In 1913, German electrical exports totalled 467,500,000 frs., as against 189,000,000 frs. for England, and 146,000,000 frs. for the United States. But these positions have vastly changed—not to the fiscal advantage of Germany. The manufacturers of Sweden, Denmark, and Russia have also been taking advantage of the rich opportunities afforded them, and have been establishing a large and lucrative business beyond the normal. English exports of electrical machinery and goods in 1913 amounted to £7,680,000; but as home calls intensified, there was a great reduction, which, however, in 1916 began to be retrieved, and then amounted to £5,659,000. Imports showed only a small reduction; and the goods came principally from the United States. But in November last, the Government forbade further imports as unnecessary. English works are now able to supply all installation material; and the writer of the article thinks that this is the reason for the prohibition of the import of meters. The fact of the matter is that home conditions are such that the Government do not want more electric installation work carried out than is necessary for the maintenance of munitions output. French exports dropped considerably the first years of the war, but rose again, chiefly through the export of electrodes. Switzerland has been doing a good business with batteries and lamps to France; and Italy also requires large supplies of electrotechnical products. Japan, formerly large importers, is now able not only to meet her own requirements, but to intervene in the markets of the world. She has an advantage in ample copper resources, which are available at small cost. The Dutch and Spanish markets have also undergone considerable developments. The coldly stated facts in the article will cause some concern to the German manufacturers, who before the war were getting along so comfortably with the work of electrical penetration in all parts of the world. At the close of the war, they will, through home conditions, find some difficulty in resuming their overseas business; and in several countries they will find, through war-impelled developments, that German goods are no longer wanted. Besides, most civilized countries will prefer to do business with people who in the war have kept their hands clean, and have maintained themselves free from the devilry and the barbarity in which the Germans have shown themselves such master-hands.

Women and Meter Reading.

Women have accomplished marvels during the war. They have entered strange lands in the matter of work, and have shown considerable *nous* and adaptability—filling with proficiency the places vacated by men. Where they have not been altogether successes, there may be something in the nature of an external obstruction, and not necessarily any want of intelligence or insufficient aptitude. We can understand that, in the matter of electric-meter reading, there may be failures. Looking back, we have known grave errors made by men in the reading of such meters, and errors that have continued over a long span of time. Moreover, meters are often for convenience in fixing located in spots that are very inconvenient for reading their registrations. We sympathize deeply with some meter readers; for their work is not always of a congenial character. "Meteor" in the "Electrical Times" expresses his sorrow at hearing that women have "in some places" proved unsatisfactory for such work. In Hull, for example, women have been found unsuitable. The errors in their calculations seem to be rather formidable; and it is considered that boys would be more trustworthy. The wording of "Meteor's" reference shows that Hull is not an isolated example. "In some places," he says; so that the women meter readers at Hull need not reproach themselves over any individual deficiency. And Hull—well, it is Hull.

Electricity and All-the-Year-Round Daylight Saving.

The "Electrician" calls attention to an address, by Mr. S. Insull, the President of the Commonwealth Edison Company, in which estimates were given of the results of the application of the daylight saving scheme in America. It is calculated that in seven months there would be a saving of about 300,000 tons of coal, but a loss in revenue to supply undertakings of about $9,500,000. From the latter figure there would have to be deducted the saving in fuel, computed at $900,000. Mr. Insull sees an advantage in daylight saving for electricity supply if it applied to the whole year, in that the day power load and the evening lighting load would not overlap to so great an extent as at present. If the change proceeded all the year round, not only would an additional 100,000 to 125,000 tons of coal be saved, but upwards of 400,000 KW. of plant capacity would be released, representing a capital of 150 to 200 million dollars. The electricity available by the reduction of the winter peak could be sold for the supply of essential industries.

Heating and Cooking at Brighton.

The Brighton Electricity Department does not appear to have made extraordinary strides in the matter of electric heating and cooking, notwithstanding the special efforts of a time ago. It is reported that the total number of such appliances hired-out is only 425. The heating and cooking business seems to be wrapped-up securely from curious eyes in the motor business. The hiring of motors and heating apparatus, it is stated, produced a rental in the last financial year of £1857. The revenue from power supplies, which include cooking and heating, amounted to £17,506. The number of units sold was upwards of 3 millions, at rates varying between 1¼d. to 1¾d., subject during part of the year to an increase of 10 p.ct. Special contract supplies contributed £13,917. These supplies combine a certain amount of cooking and heating business, at rates varying between 0·708d. and 1·75d. per unit. This is rather interesting We wonder what the Ship Hotel pays for the energy supplied to its electrical apparatus—assuming it is still in use.

A HOME-MADE BRIQUETTE PLANT.

By Henry M. Balsam, the Engineer of the Pernambuco Tramways and Power Company, Ltd.

The principal feature of interest in the briquette plant about to be described is that of it having been constructed entirely out of scrap material taken from the junk heap, and ultimately built-up and set together in our own shops. As a result of our first experiments, a briquette press was produced embodying the piston principle. It was built-up from an old steam locomotive, and contained many features of note, though it early proved unsatisfactory, and was finally scrapped to make way for the cylindrical type now in use.

Though modelled on lines similar to the well-known Dutch oil process, it was not at all intended that the process, as developed by us, should reach the same state of perfection it has reached in similar, but larger, plants of its kind. Even though one or two of the less important operations were of necessity eliminated—being economically prohibitive in a plant of this size—the finished product has much to recommend it, and practically fulfils all the essential conditions of a good briquette. One must here remember that smoking during the first stages of combustion is an unavoidable accompaniment of all briquettes using a tar binder; whereas the calorific value of the briquette depends altogether on the quality of the ingredients.

Normally, a briquette would not have suggested itself, and could not even have justified its existence; but several months carbonization of steam coal in our retort-house led to the accumulation of enormous quantities of coke dust. It may be well to mention here that, owing to the close proximity of the electric power station of the Company to the gas-works, no steam is generated at the latter, thereby precluding the usual disposition of the coke breeze, invariably consumed under the works' boilers. As tar and pitch in this locality find but an uncertain market, it was quite evident that the installation of a briquette plant to produce coke-dust briquettes with a tar and pitch binder would make an excellent investment.

GENERAL VIEW OF THE BRIQUETTING PLANT.

General Outline of the Plant.

The plant consists essentially of a receiving platform or hopper where the coke dust, charcoal dust, or sawdust is delivered to the plant; a tar and pitch boiler, in which tar and pitch are heated and mixed to the proper proportions; a paddle mixer, which performs the preliminary mixing of the ingredients; a shoot, which receives the crude mixture and directs it on to a belt conveyor, which delivers it to a hopper. From the hopper the crude mixture is delivered to an edge runner, which grinds and masticates the mixture, bringing it to the proper plasticity. A shoot picks up the masticated mixture and directs it into the press, where it is pressed into briquette form. A belt conveyor receives the slabs of briquettes and carries them up to the separating screen, which receives the falling slabs. The fall causes the briquettes to break-up into units, parting with their fins as they roll down into a Decauville car. Decauville cars run on the works' track, for facilitating the removal of briquettes and supplying raw material for the plant.

Outline of the Process.

Solid Ingredients.—The dust (coke, charcoal, or sawdust) is permitted to dry under cover for several days just prior to its amalgamation into the briquette,

Binder.—Crude tar and pitch in almost equal proportions are heated and thoroughly mixed in the boiler.

Crude Mixture.—The dried solid ingredient and the hot liquid binder are uniformly fed to the paddle mixer, in which the preliminary mixing is accomplished; the mixture then being automatically conveyed to the edge runner. The binder enters in varying proportions, ranging between 6 and 10 p.ct.

Final Mixture.—In the edge runner the mixture is thoroughly ground and masticated. Here the operator can adjust the quality of the mixture by the addition of tar or moisture; and, with the aid of exhaust steam from the pump-house, he can bring the mass to the proper plasticity and temperature.

Crude Briquette.—The mass enters the cylindrical press from above, and drops out below in the form of briquettes united by fins of approximately $\frac{1}{8}$ in. thickness. It is in this form that they are carried up on the conveyor and eventually dropped on the separating screen.

Finished Briquette—Although not altogether cooled and dried at the end of their journey forward on the conveyor, the briquettes are sufficiently cohesive to resist bodily breakage. They readily part from each other, leaving the fins to wear off during the downward slide on the screen.

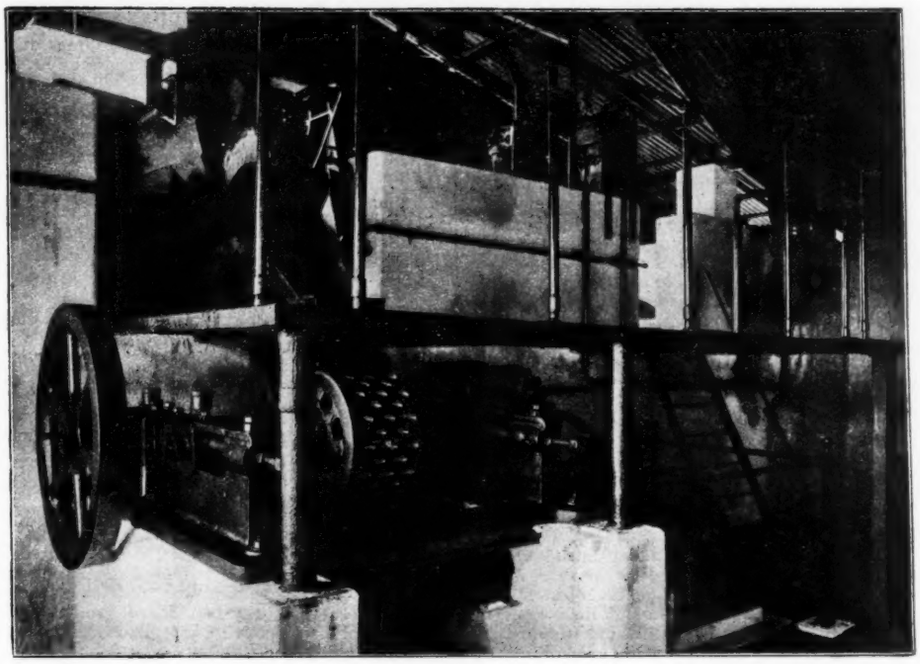
Further expense in connection with the plant was not warranted, or else a separating screen of the rotating kind would have been installed. Complete trimming of the briquette, however, is an undeniable advantage, as the loss in handling briquettes with untrimmed edges may run up as high as 6 p.ct.

The process is continuous from the moment the dust, pitch, and tar are fed into the paddle mixer. The ingredients gradually mix on their way through it, making their appearance at the discharge shoot. This guides them to the belt conveyor, which, in turn, carries the mixture up to the edge runner. Here is where the process becomes intermittent, because a few minutes are required to thoroughly grind and masticate the crude mixture. At regular intervals of a few minutes the lip of the discharging shoot is inserted into the edge runner bowl, and the finely-ground mass, already brought to the proper temperature and consistency, is dropped into the press—at once delivering as many pressed briquettes as the quantity of material will allow.

The briquettes are of elliptical form, $3\frac{1}{2}$ in. long, $2\frac{1}{2}$ in. wide, and $1\frac{3}{4}$ in. thick. The size and form were adopted as being most suitable for our purpose. In the process of separating the fins from the briquette proper, the briquettes roll their way down the incline, and in so doing break off the fins, which find their way through the screen. This waste material is picked up several times during the day, and again fed to the paddle mixer. The briquettes are finally stored in shallow heaps in the open until thoroughly dried, and ready for distribution.

How the Plant was Built.

The tar-tank was made from a section of an old boiler, and the furnace for heating it from old fire-brick, of which every gas-works has always a sufficient supply on hand. The body of the paddle mixer is a section of an old hydraulic main built into a brickwork setting, so designed that the hot products of combustion from the tar-boiler furnace circulate underneath it before they pass out through the chimney. This is to keep the mixture warm during



THE BRIQUETTE-MAKING MACHINE.

the operation of mixing. The mechanism of the mixer consists essentially of a central shaft, with paddles attached in spiral form, slightly overlapping each other. The paddles are given the necessary curvature to further the mixing action and to facilitate the forward movement of the mass. The body of the mixer is likewise given a slight incline, with the same end in view.

The conveyor material was all taken from an existing coal conveyor, some time now out of use. The edge runner is an old mortar mill that has served in the construction of our vertical retorts. The cylindrical press was originally a coal-breaker; the cylinders, of cast-iron, having been especially cast for the purpose. They are hard castings; the cylindrical surfaces being hollowed out with forms to match the shape of our briquette. A scale or fin of about ⅛ in. thickness forms in the interstices between what should be the surfaces of contact of the cylinders. Perfect contact between the cylinders, apart from being mechanically impossible, is not convenient in the circumstances.

Two independent motors, of 10 and 15 H.P. respectively, supply all the power for the plant. The 15 H.P. motor drives the edge runner (geared drive), which, in turn, transmits power to the belt conveyor, which transmits its power, by means of a chain drive, to the paddle mixer. The 10 H.P. motor operates the press by means of geared drive, at the same time actuating the belt conveyor. The plant has a working capacity of from 6 to 7 tons per ten-hour day. Considerable difficulty was experienced in the early times with the right mixture and proper proportions; the operation still requiring a reasonable amount of skill and expert handling. It takes four men to operate the plant—one to attend to the tar and pitch boiler, also taking general charge of the plant; one to feed the raw material to the paddle mixer; one at the edge runner and press; and one to bring the raw material, remove the finished product, and return all the fin waste to the receiving platform.

I do not think that a briquette plant is at all an essential, or even desirable, addition to any gas-works, however large it be; but I am quite certain that if any one was forced to carbonize large quantities of steam coal instead of gas coal for one reason or another, and could not consume any of the coke breeze in the works, he, like ourselves, would welcome any plant that could convert a waste material into a useful saleable product.

SCIENTIFIC PRODUCTS DEVELOPMENTS.

The layman has but a superficial notion of the progress that has been made in the manufacture of scientific products during the war; but the British Scientific Products Exhibition, on which articles appeared in our last issue (and which will continue open to Sept. 7), will inform him, so far as it is permissible to do so, of many things that have been accomplished. These accomplishments are permanent defeats for the enemy, though we are thinking less of this than the strengthening and stabilizing of the independence of the British Empire. A good piece of preparatory work is offered to the lay visitor in a hundred or so pages of contributions which preface the catalogue, and which have been made by men with special knowledge of the subjects with which they deal.

The introductory article is written by Prof. Gregory; and it is on the "Recovery of the Key Industries." There is a breadth and depth of thought in it, and much that is philosophic. We have here pictured creative science, purposeful invention, and skilled labour as the three legs of the tripod on which industrial development is built. It is obvious that nothing is gained by strengthening one leg of a tripod, and neglecting the others; for as a chain is no stronger than its weakest link, so is the measure of the strength of the tripod that bears the weight of progressive industry. Without the triple alliance of the scientific discoverer, the progressive manufacturer, and the skilled operative, no nation can expect to be in the van of the march of modern civilization. There Prof. Gregory focuses the lines upon which we must progress if the deliberate intention is industrial progress. He shows that the electrical, synthetic dyes, and optical industries are examples of economic loss to this country through the neglect of industrial opportunities offered by scientific discoveries.

We have Sir William A. Tilden, F.R.S., describing the applications of the principles of chemistry to industry under three heads, while admitting that the classification is a broad one. He thus enables the visitor to understand more readily what has been going on in connection with chemical processes since the outbreak of the war. The three divisions are: (1) Heavy chemicals; (2) fine chemicals; and (3) applications to arts and manufactures. He gives an indication of the chemicals which come under the first two heads. In some of those under No. 1, gas manufacturers are particularly interested. For example, sulphuric acid, nitre cake, sulphate of ammonia, together with the processes by which atmospheric nitrogen is fixed in the form of cyanamide, ammonia, and nitrate. In the fine chemicals division, he refers to the numerous artificial dyes derived primarily from the hydrocarbons, benzene, toluene, &c. He also alludes to the intermediates, among which are found numerous substances used as medicinal agents, antiseptics, and perfumes; while other closely connected compounds—*e.g.*, trinitrotoluene and picric acid form valuable explosives. As to the application of chemistry to the arts and manufactures, Sir William mentions the great neglect of organic chemistry in this country until recent years; the consequence being that in the production of chemicals in the second class there has been an almost complete monopoly established in Germany. British manufacturers of heavy chemicals have up to the present time maintained their predominant position; but before 1914, the Germans had already begun to boast that they were beginning to attack this position, and were confident of ultimately succeeding in beating the British out of the field. The successful establishment of Haber's process for the production of ammonia from the elements hydrogen and nitrogen, and the oxidation of this ammonia to nitric acid—the essential material for all explosives—has enabled Germany from the start of the war to be independent of natural sources of nitre, and to some extent justify the threat already referred to. In August, 1914, the position of the British chemical industry was serious. There was experienced at once a deficiency in the plant and material for the production of explosives, dyes, and drugs, and a wholly inadequate supply of chemists with sufficient knowledge and experience to carry out the somewhat complicated processes involved in their manufacture. British chemists and manufacturers have, however, risen to the occasion

with a display of activity, resource, and ingenuity which is highly creditable.

The position in which this country was placed at the outbreak of war in respect of the supply of dyes is described by Dr. J. C. Cain as little short of appalling. This is in a subsequent article on "Intermediate Dyes and Products." Few among laymen are aware of the complicated series of operations through which coal tar has to pass before its constituents can be separated and purified. Dr. Cain gives information in, of course, brief form—beginning with the intermediate products which were made before the war on a very large scale. Although a few of them were satisfactorily manufactured in England, and were equal to the German article, yet the huge scale on which their production was carried out on the Continent, and the obvious dependence of the finished dyes on their supply, led German manufacturers to the almost entire control of the dye industry through them. The final stage, consisting of the combination in various ways of these intermediate products so as to form the dyes, requires similar mechanical and intellectual means for its successful completion; and a whole host of supplementary chemicals—such as acetic, sulphuric, nitric, and hydrochloric acids, caustic soda, potash and lime, sodium carbonate, salt, ammonia, and chlorine—are needed for carrying-out the multiplicity of chemical operations through which the coal tar passes before the finished products are reached. Fortunately, our great inorganic chemical industry was in a position to furnish all of these, with the exception of potash; and it is pleasing to record that, largely owing to the efforts of Mr. Kenneth Chance, this important material can now be produced in quantity in this country, thus eliminating our former dependence upon the potash deposits of Stassfurt. Handicapped by the necessity of diverting all chemical resources into the production of munitions of war, progress has inevitably been slow; and the supply of chemical plant, labour, &c., has also suffered owing to war conditions. Dr. Cain refers to what has been done in planting the roots of the dye industry more deeply and firmly in this country.

Passing over an article on "Drugs and Fine Chemicals," we come to one on "British Fertilizers," by Dr. E. J. Russell, the Director of the Rothamsted Experimental Station. The war has emphasized the need for additional food production in this country, and has brought about an enormous extension of our capacity for producing sulphuric acid—the most important single item in the production of fertilizers. Dr. Russell brings into view the various home produced fertilizers. Touching upon sulphate of ammonia, he says that the annual production in 1913 was 433,000 tons, while the home consumption was only 60,000 tons—much of the balance being exported. However, the export trade was not entirely a matter for congratulation, for the community would have gained considerably if the fertilizer had been applied to our own land, and made to yield additional crops here. Since the war this has, in fact, happened. It is officially stated that 238,000 tons of sulphate of ammonia were used in 1917-18 for agriculture. Certainly food production is now far greater than ever before in the country. In the manufacture of sulphate of ammonia, as in that of superphosphate, an important item in cost is that of the sulphuric acid; and any extension of the industry would absorb some of the anticipated surplus of acid occasioned through plant extensions for war purposes. Improvements have been made in the plant, with the view of increasing the yield of ammonia, and in the stills and saturators. The process as now carried on with modern appliances is, the author observes, most efficient, and can be made to yield a very pure product.

There is an article by Prof. H. E. H. Carpenter, F.R.S., on "Ferrous and Non-Ferrous Metallurgy," in the course of which we notice he regards as satisfactory the progress made during the war towards the solution of the problem of the production of good refractory materials. In passing, he refers to the great increase that has been made in the production of steel by electric-furnaces. Previous to the war, the output was so small that it did not figure in any returns of steel production. Nevertheless, in 1917, no fewer than 110,000 tons of electric steel were made, of which about 90,000 tons were in the form of ingots, and some 20,000 tons in the form of castings. At the present time over fifty furnaces are in operation in the various Sheffield works. Among other products made in electric-furnaces are the various ferro-alloys—ferro-chromium, ferro-tungsten, ferro-vanadium, and ferro-molybdenum—which are used in the manufacture of alloy steels.

The "Rarer Elements" are dealt with by Mr. James H. Gardiner; and he finds gratification in the fact that the supply of thorium and cerium is now assured for the British incandescent mantle industry. "Rich monazite sands and other thorium minerals are now being imported from Southern India, and other localities; and our manufacturers have set to work in earnest, plant has been erected upon a large scale, and at the present time, in spite of restricted labour conditions, salts of thorium and cerium are being produced of a quality and at a price that leaves little to be desired. If in the future the supply of mineral can be assured, and sufficient State support given to make the outlay upon the necessary works a safe undertaking, there will be no reason to go away from home for supplies sufficient to meet all our own needs; and the British chemical manufacturer will be able to compete in fair trade for a share in the supply of materials for which there is now a world-wide demand."

Among other articles is one on "Physical Apparatus" by Mr. C. R. Darling; and on "Illumination" by Mr. L. Gaster, in which he alludes to the remarkable illustration that has been given during the war to the importance of artificial lighting in industry, on account of health, safety, and efficient work. He finds every reason to hope that, with proper encouragement, the whole artificial lighting industry will be placed on a firm footing after the war. The great awakening in the "British Glass Industry" is sketched by Dr. H. E. S. Turner, M.Sc., of the Sheffield University; and it is seen that the material results achieved show good progress. A birdseye view of what has been done in connection with "Refractory Materials" is provided by Mr. J. A. Audley, B.Sc., in the course of which acknowledgment is made of the work accomplished by the Joint Committee of the Institution of Gas Engineers and the Society of British Gas Industries, under the direction of Dr. J. W. Mellor.

The articles that are mentioned in the foregoing sketch do not exhaust the interest of the several contributions, which conclude with one furnished by the Scientific and Industrial Research Department, on "Industrial Research Associations." It is remarked that no branch of the work of the Department is of more interest than that devoted to the new scheme for the establishment of Research Associations. Research Associations are companies established under the Companies Acts by the firms in any industry which desire to apply science to the problems of manufacture. They are limited by a nominal guarantee; and they work without any profit. If the Memorandum and Articles of a Research Association conform to the scheme of the Department, the regular subscriptions of the firms concerned are free from income and excess profits taxes; and the Association is qualified to apply to the Department for a grant in aid from the fund of 1 million sterling voted by Parliament for the purpose rather more than a year ago. The aim of the Government in promoting these Research Associations has from the first been to leave them, when once satisfactorily established, to manage their own affairs. The control of an Association is placed in the hands of a council appointed by the contributing firms; and the Department will only reserve power to intervene in the national interests when these are likely to be affected by the action of the Association.

PRICES OF TAR AND AMMONIACAL LIQUOR FROM GAS-WORKS IN SCOTLAND.

IT will be recollected that a few months ago the Scottish Gas Council, on strong representations being made to them on behalf of gas corporations and companies as regards prices obtained for bye-products from distilling, resolved to take action, and appointed a Special Committee to deal with the matter. Negotiations were immediately entered into, and several meetings between the parties have been held. The distillers agreed, and were indeed anxious, that some satisfactory working arrangement as to fixing prices for all gas-works in Scotland should be decided upon. General agreement was reached that all gas-works should be on the same basis as to price, and that the rates fixed should be as at the distillers' works—each works to bear its own cost of railway dues according to its geographical position; the distillers to provide the tanks and casks. It was agreed that, as regards ammoniacal liquor, this product should be purchased on a scale to its content of total ammonia expressed in pounds of sulphate of ammonia per 100 gallons.

As a result of the negotiations, parties were unable to come to a satisfactory mutual agreement as to prices; and the Committee of the Gas Council decided to approach the Ministry of Munitions and lay the whole facts and circumstances before them. This has been done. It was represented that the price of tar from gas-works in past years had been fixed by the distillers; that there was an absence of competition for the products; and that there being no open market obliged gas undertakings to accept the terms offered by the distillers. Further, that the prices offered by distillers were much too low and did not give adequate value having regard to the prices of the bye-products produced, and that there was an absence of equity in price as between one gas-works and another. The gas industry for some time past has been obliged to meet greatly increased costs for coal, and that the prices of the products have not increased in proportion, or, indeed, to any real extent, having regard to the value of the products for national needs, or in keeping with the advances in price of other industrial material.

The gas-works, until a settlement has been arrived at, are not prepared to enter into fresh contracts. Meetings have recently been held with representatives from the Ministry; and it is expected that at an early date a definite proposal will be put before the parties in order to remove the present deadlock. It should be stated that the agreement proposed as between the National Gas Council and distillers in England does not affect the situation in Scotland, as none of the Scotch distillers were consulted, and are therefore not parties to the proposals.

Readers not in possession of facilities of the like character in connection with their own undertakings, may note the fact that Mr. Norton H. Humphrys, of No. 5, Wyndham Road, Salisbury, having a laboratory for the purposes of gas-works in which he is interested, is in a position to undertake examinations of coal or coke for moisture, volatile matter, and ash, tar for benzol content, or partial or full analyses of ammoniacal liquor, sulphate of ammonia, sulphuric acid, and purifying materials.

SIXTY YEARS AGO.

[From the "Journal" for August, 1858.]

Gum Leaf Gas.—The "Melbourne Argus" contains a statement made by Mr. Praagst at a meeting of the Municipal Council of Castlemaine, relative to the manufacture of gas from the leaves of the gum-tree, which abounds throughout the Australian continent. Mr. Praagst said: Shortly after my arrival in this Colony, in the year 1855, when travelling through the interior, I observed vast quantities of that indigenous and widely-spread tree, the "gum;" and it struck me at once, from the appearance of its leaves, that it would most probably be available for the production of gas. A few experiments soon satisfied me that my surmises as to the properties of the gum-leaf were correct; and I felt that, in a country like this, where from its geological formation there is an evident scarceness of coal, the substitution of gum-leaves for that mineral, and the production of gas from the all-abounding substitute, would be of vast importance in an economical, social, and commercial aspect. I at once communicated my idea on the subject to some friends, among whom I may mention Dr. Macadam; and I determined to try the experiment of extracting gas from the material in question. My first essay was at Carlsruhe Hotel, where, though the appliances were very limited and crude, I successfully introduced a brilliant light.

"Carbocoal" Smokeless Fuel and Liquid Products.

Reference was made in the "JOURNAL" for July 30 [p. 207] to "Carbocoal"—a low-temperature carbonization product—the manufacture of which as a smokeless briquette fuel is stated to have been perfected in the United States by Mr. Charles H. Smith, of the Malcolmson Briquet Engineering Company. In addition to the "Carbocoal" fuel, the distillation is claimed to give tar of double the quantity produced in the ordinary bye-product coking process, ammonium sulphate in excess of that produced by the latter, and gas to the extent of about 9000 c.ft. per ton of coal carbonized. The fuel represents some 75 p.ct. of the raw coal. The special feature is a double distillation at different temperatures. The raw coal is crushed and then distilled at 850° to 900° Fahr. The result is a large yield of gas and tar, and a product rich in carbon. This product is mixed with pitch obtained from the tar and made up into briquettes, which are distilled at 1800° Fahr., resulting in the production of the fuel, with recovery of additional tar and gas, and a substantial yield of ammonium sulphate. The first distillation is continuous; and the coal is kept agitated by paddles, which also feed it through the retort. In the second distillation, all evidence of pitch disappears, and the briquettes become more dense. The yield of ammonium sulphate is about 21 lbs. per ton of raw coal, and of gas about 6000 c.ft. from the first distillation and 4000 c.ft. from the second. As to liquid products, below is a comparison with the coke-oven process, showing the gallons per ton of raw coal:

	Coke-Ovens. Gallons.		"Carbocoal." Gallons.
Light oil	0·27	..	1·583
Middle oil	0·44	..	3·326
Creosote oil	0·78	..	3·236
Heavy oil	1·26	..	11·365
Pitch	4·66	..	10·190
Loss	0·09	..	0·300
Total	7·50	..	30·000

Peat Resources of Canada.

Canada possesses enormous deposits of peat; and their utilization has been discussed in a paper by Mr. B. F. Haanel. In this the author said that peat has been, and can be, used for very nearly all the purposes for which coal for over a century has been the only fuel employed; but for certain reasons the plants erected at large expenditure to accomplish these ends are no longer in operation, though the products obtained have been eminently satisfactory. Some of the Canadian bogs are exceptionally high in nitrogen content; and this should render the peat eminently suitable for use in bye-product recovery gas-producer plants. It has, in fact, been shown that, in special cases, a large profit on the capital outlay required could be made on the recovery and sale of the sulphate of ammonia alone—assumign that the power gas be thrown away. Such installations do not, however, prove profitable when under a certain capacity; and 4000 H.P. is the smallest plant recommended. The peat fuel must be utilized as near as possible to the source of its manufacture; and the author suggested that a plant suitably situated with respect to a city or group of towns or villages could supply gas which could be used for power, industrial, or domestic purposes, thus rendering those communities entirely independent of coal. He pointed to the fact that a large manufacturing and industrial area in South Staffordshire is supplied with a power and industrial gas generated by a Mond gas plant situated near a source of low-grade coal, and said there was no reason why similar plants using peat should not be erected in Canada. He added that attempts have been made to retort peat for the sole purpose of generating illuminating gas; but they failed owing to the high cost of the peat used. The utilization of peat for the production of coke, illuminating gas, or for the recovery of oils alone, depends entirely on the quantity of peat fuel available, and the price at which it can be obtained.

THE USE OF NITRE CAKE IN THE MANUFACTURE OF SULPHATE OF AMMONIA.

By P. PARRISH.

JUDGING by an article that appeared in a recent issue of the "Iron and Coal Trades Review," interest has been revived in the above subject.

In a contribution to your issue of Feb. 20, 1917, a brief survey of the chemical and physical problems arising in the utilization of nitre cake in the manufacture of ammonium sulphate was made. The limitations involved in the use of this bye-product, in partial substitution for sulphuric acid, were explained; and certain well-defined conclusions were arrived at.

Broadly speaking, the position at the early part of 1917 was this. For economic reasons and practical considerations, the production of the mixed sulphates of sodium and ammonium, containing a higher content than 10 p.ct. of Na_2SO_4, was regarded as inexpedient. To manufacture such a mixed salt, it was suggested that the nitre cake should be introduced:

(*a*) In a ground but solid form to the saturator, or
(*b*) That this bye-product should be dissolved in the feed-acid in suitable lead-lined twin tanks, placed contiguous to the saturator, at such a height as would admit of the nitre cake acid solution being gravitated to the saturator.

It was further indicated that the exclusive use of nitre cake was a feasible proposition. Indeed, it was suggested that advantage should be taken of the principles of fractional crystallization, by which the respective sulphates of ammonium and sodium could be separately produced.

A brief outline of the progress which has been made since 1917, and the investigation work that has been undertaken, will doubtless be of interest.

The Acid Section of the Ministry of Munitions organized meetings of a technical character to discuss this problem and to make arrangements for practical trials at a few works.

Consequent on the commendable procedure instituted, a process on the lines of method (*a*) was put into operation at the Stafford Gas-Works. The nitre cake was introduced to the acid-charge pot—a device admitting of easy and ready application. Due to the intelligent interest and careful chemical supervision exercised by the Engineer and Manager (Mr. W. M. Valon) this method of working has proved to be a success, and has resulted in the production of a satisfactory mixed salt (for which there is a ready sale), as also economy of working.

In operating this process, attention must be given to the following points. The sulphuric acid content of the bath should not be allowed to fall below 6 p.ct.; otherwise ferrocyanides may be formed, and "blue" salt will ultimately develop.

It should be remembered that the specific gravity of the liquor in the bath differs somewhat materially from that usually obtaining when using sulphuric acid exclusively. The Twaddel hardly forms any criterion as to the acid content. The importance, therefore, of determining the content of free acid in the saturator liquor, by titration, cannot be too strongly emphasized.

The addition of the nitre cake should be effected with regularity, and an effort made to secure this bye-product of substantially uniform quality, so as to avoid a too widely varying composition of the final salt, containing the mixed sulphates. Frequent tests should be made to ascertain the presence and extent in the nitre cake of undecomposed nitrates, which are the chief and most prolific cause of the corrosion of the lead.

The saving to be effected by the use of nitre cake in partial substitution for sulphuric acid is shown in the financial statement below. This is an important aspect, as it is unlikely that engineers having sulphate of ammonia plants will embark on this new method of working, except they can be assured of something more than "change for sixpence."

Cost for Acid per Ton of Sulphate, in the Production of 100 *Tons of Sulphate of Ammonia, using Sulphuric Acid exclusively.*

$\frac{70{\cdot}86 \text{ tons of } H_2SO_4}{80 \text{ p.ct. } H_4SO_4}$ = 88·6 tons of 80 p.ct. acid at £5 0s. 7d. = ... £445 12 0
or £4 9s. 1d. for acid per ton of sulphate of ammonia.

Cost for Acid per Ton of Sulphate in the Production of 100 *Tons of Sulphate of Ammonia, using Acid and Nitre Cake in such Proportions as to give a Mixed Salt with* 10 *p.ct.* Na_2SO_4.

82·7 tons of 80 p.ct. acid, at £5 0s. 7d. = ...	£415	18 2
14·7 ,, nitre cake, at 15s. = ...	11	0 6
	£426	18 8
Plus extra labour in handling the nitre cake, together with steam. 14·7 tons of nitre cake, at 2s. 6d. per ton	1	16 9
	£428	15 5

£4 5s. 9d. for Acid per Ton of Sulphate of Ammonia.

NOTE.—No allowance is made for the extra quantity of sulphate produced in the latter case, as the content of ammonia involved in each case is identical.

Method (*b*) was started at a coke-oven works, but was not pursued for any length of time. It was reported that corrosion of the leadwork of the dissolving tank occurred; and, fearing that

this action might possibly be extended to the saturator, the method was discontinued.

To account for the above reputed corrosion, the writer can only assume that an inferior quality of nitre cake—nitre cake containing an excess quantity of undecomposed nitrates above the 0·5 p.c. specified—or, possibly, arsenical acid, was used during the experiment. He is reluctant to believe (as has been ascribed by the management of the particular works) that the high concentration of the acid nitre cake solution was the real cause of the corrosion. Indeed, the following calculation suggests that the concentration was not unusually high.

To produce 100 tons of mixed sulphate with a content of 10 p.c. of Na_2SO_4.

14·7 tons of nitre cake with 32 p.c. H_2SO_4 content and
82·7 tons of 80 p.c. acid are required.

97·4 tons.

	Tons of H_2SO_4.
The above quantity of nitre cake represents	4·70
82·7 tons of 80 p.c. acid represents	66·16
	70·86 tons.

∴ the percentage of H_2SO_4 in the acid nitre cake solution would be:

$$\frac{100}{97{\cdot}4} \times \frac{70{\cdot}86}{1} = 72{\cdot}75 \text{ p.ct.}$$

To dissipate the idea that the temperature of 100° C. (at which temperature the acid nitre cake solution has to be maintained to avoid crystallization) would account for the corrosion, it need only be pointed out that in the concentration of chamber acid in under heat lead pans a temperature of 178° C. has to be continuously maintained in the last pan of the series, if 80 p.ct. acid is to be produced. Thus the lead is subjected to the constant action of 80 p.ct. acid at a temperature of 178° C. without serious corrosion.

If the assumption that arsenical acid was used is justified, then the corrosion is explicable.

When arsenical chamber acid, containing the equivalent of 150 to 200 grains of As_4O_6 per gallon, is concentrated to 80 p.ct. acid in under heat lead pans, as the temperature of the acid approaches 130° to 140° C., the acid becomes turbid and milky in appearance. Close examination reveals that the acid has a decidedly corrosive effect on the chemical sheet lead.

At first, it was suspected that the presence of traces of zinc in the lead (which is not unusual when this metal is refined by the Parkes process) was the cause of the corrosion. Unfortunately, however, this action is common to the best chemical sheet lead refined in the most scrupulous manner by the Pattison process. This phenomenon of "milky pans" is known to most managers of acid works. Despite the adoption of several methods for arresting the singular dissolution of the lead under the conditions described, all suggested remedies have so far proved ineffectual, and apparatus made wholly of "Vitreosil" (fused silica) is now resorted to for the concentration of such acid.

The writer is still convinced that, given a suitable quality of nitre cake and non-arsenical acid of 70 or 80 p.ct. H_2SO_4 content, there is no reason why method (*b*) should not prove equally as successful as method (*a*).

Let us now examine the more interesting aspect of this subject—viz., the process in which advantage is taken of the principles of fractional crystallization. Fortunately, the Ministry of Munitions (Acid Section Department) was in possession of reliable data concerning the equilibria between the phases ammonium sulphate, sodium sulphate, sulphuric acid, and water; and it was evident from elaborate determinations which had been made that, at a temperature below 46° C., sodium sulphate would crystallize out from a solution containing the sulphates of sodium and ammonium, sulphuric acid, and water.

The application of the above-cited principle in the operation of existing ammonium sulphate plants was certainly not difficult. A suitable lead-lined box, provided with grid and lead steam-coils, is the only extra plant required. A nitre cake solution with an approximate content of 6 p.ct. H_2SO_4 is made by dissolving nitre cake in water. This solution is fed to the saturator along with the acid in certain fixed proportions. The ammonia and steam passing forward from the stills in the case of ordinary sulphate of ammonia plants, or the ammonia with the coke-oven gas in the case of direct and semi-direct plants, enters the saturator; absorption of the ammonia takes place; and the specific gravity begins to increase. After a time deposition of sodium sulphate containing some of the corresponding ammonium salt takes place. At this stage, an excess of back pressure gradually begins to be thrown by the liquor in the saturator. This is the signal for the ejection of some of the saturator liquor into the mother-liquor well.

Following the latter operation, the supply of acid and nitre cake solution to the saturator is resumed, till the normal level of the bath has been restored. Meanwhile the solution discharged to the mother-liquor well is cooling; and, on reaching 46° C., practically the whole of the sodium sulphate will crystallize-out. The specifically lighter mother liquor containing ammonium bisulphate and lesser quantities of sodium bisulphate is again injected to the saturator, and so a definite cycle of operations is established.

This has been the *modus operandi* pursued at the Llwynypia works of the Glamorgan Coal Company, and Mr. M. G. Bowen (the Coke-Oven Manager) of the works is to be congratulated on the successful operation of a process involving the application of the above physical principle. Later on will be found an excerpt from an article published in the "Iron and Coal Trades Review," giving further details of the process.

The writer need only remark that it would be difficult to justify some of the advantages enumerated in the article named, as attending the use of nitre cake. Increased efficiency and elimination of tar blockages can only be ascribed to more efficient working and better supervision. It would appear desirable in connection with the process as operated at Llwynypia that the Glauber's salt ($Na_2SO_4 . 10H_2O$) crystallizing-out in the mother-liquor well should be washed with water with a view to removing traces of ammonium sulphate, which is associated with the crystallized sodium sulphate, before the latter is discarded or sold.

The necessity for the washing of the Glauber's salt is accentuated, when it is remembered that with each ton of 80 p.ct. acid derived *viâ* nitre cake, 67·3 cwt. of Glauber's salt are produced; and that the latter product, if left unwashed, may carry with it the equivalent of 0·5 to 1·0 p.ct. of NH_3, as ammonium sulphate.

It will be interesting at this juncture to examine the "Water-Balance" of the process as it is operated at Llwynypia works. Eighteen tons of sulphate of ammonia are produced per week, containing 23·8 p.ct. of NH_3 and 0·435 p.ct. of H_2SO_4. About 3 tons of nitre cake per week (say 35 p.ct. of H_2SO_4 content) are used, along with the necessary 80 p.ct. acid. A 6 p.ct. H_2SO_4 solution of nitre cake is fed to the saturator.

Calculations based on the above data furnish the following statement:

Dr.	Tons.	Cr.	Tons.
To water introduced *viâ* nitre cake solution per week . .	14·50	By water removed by crystallization of 95 p.ct. of the Na_2SO_4, as Glauber's salt .	2·34
		By saving of water effected due to the use of 80 p.ct. acid in lieu of 64·5 p.ct. .	3·72
		By balance (being water which must be removed in the process)	8·44
	14·50		14·50

It is evident from the above statement that the use of a 6 p.ct. H_2SO_4 solution of nitre cake at this gas-works (where the ammonium sulphate plant is independent of the gas producing plant) is impracticable, and that a higher acid concentration of the nitre cake solution is essential before the process can be satisfactorily worked.

It should be remembered that the volume of uncondensible gases passing through the saturator of an isolated plant is approximately 10,000 c.ft. per ton of sulphate made, or about 3 c.ft. per gallon.

In a semi-direct or direct plant at a coke-oven works, the volume of gas passing the saturator per ton of sulphate made will be of the order of 750,000 c.ft. per ton. On the assumption that the gases in the two cases cited possess the same degree of saturation with steam, it is readily conceivable (owing to the appreciably greater volume of gas in coke-oven semi-direct or direct plants) that the 8·44 tons will be removed by entrainment with the gases from the saturator.

Trial was made in the direction of the exclusive use of nitre cake on a Mond recovery plant at Langwith; and a broad outline of the process, which has been gradually improved and perfected (and for certain aspects of which application has been made for patents) is subjoined.

Parenthetically, it is worthy of note, as affecting the February, 1917, article (to which previous allusion has been made) that *inter alia* it was tentatively suggested that an available working method would be to resort to "extraneous evaporation of the mixed sulphates in acid solution of about 6 p.ct. H_2SO_4."

The gases leaving the producers on the Mond recovery plant, after having been cooled and treated in the usual way for the extraction of tar, &c., are scrubbed in a tower with a 3 to 4 p.ct. H_2SO_4 solution. On reaching the saturation point, the solution is evaporated extraneously to crystallize-out the $(NH_4)2SO_4$. The resulting mother liquor is used to wash the nitre cake. The mother liquor is maintained at a temperature of about 80° C., and the concentration of sodium sulphate in such *eau mère* is such that the dissolving of the sulphuric acid is selectively effected—very little sodium sulphate *ex* the nitre cake going into solution. The mother liquor, containing additional sulphuric acid *viâ* the nitre cake, is used in the tower; and the resultant sodium sulphate sludge is washed free of ammonia by water—the washings being used to dilute the acid in the tower.

By the above process, ammonium sulphate with a content of 24·5 p.ct. of ammonia and 0·4 p.ct. of H_2SO_4 is being produced, and saleable Glauber's salt can be crystallized-out containing only traces of ammonia, which appears to be occluded in the crystals of sodium sulphate.

The foregoing outline describes the progress so far made in the use of nitre cake in the manufacture of sulphate of ammonia, and, although it constitutes a distinct advance, it is to be regretted that the Germans are still ahead of us in the utilization of this abundant chemical bye-product.

The wedding of Captain Ralph Staley (M.C.), of the Royal Engineers, and Miss Ethel Greenwood, of Chester, has been arranged for the 4th prox., at St. Mary's Church, Chester. Captain Stanley is well known to the profession at Derby, Chester, and Londonderry, in which places he has held gas-works appointments.

NATIONAL PHYSICAL LABORATORY.

THE course of development of the National Physical Laboratory at Teddington between 1902, when it was formally opened, and the present time is briefly indicated in the report of the Executive Committee for the twelve months ended March last—this survey being regarded as particularly appropriate in view of the transfer of financial responsibility to the Department of Scientific and Industrial Research. It is a record of continuous growth. In 1902, the Laboratory comprised two departments at Teddington, for Physics and Engineering respectively, and we are told that almost at once the need of extension became apparent. Year by year, added facilities have led to a steady increase in the volume of work undertaken. As has already been noted in the "JOURNAL," the Laboratory have now been asked by the Ministry of Munitions to extend largely the provision for the testing of glass vessels for chemical work. For this, and for the manufacture of a certain class of gauges for the Ministry, new buildings are being prepared. The Air Ministry have also requested an extension of the accommodation for aeronautics work. Deep regret is expressed in the report at the loss by death of three prominent members of the General Board and of the Executive Committee—Sir John Wolfe Barry (a member of the original Treasury Committee), Mr. William du Bois Duddell (who served on both the Executive and the Finance Committees), and Mr. Thomas Tyrer (who represented the Society of Chemical Industry on the General Board, and also served on the Executive Committee).

As to the report on recent work, it is stated that a number of investigations are in progress for the Research Department—including work in the Engineering Department relative to the transmission of heat from hot surfaces to fluids in motion over them, and a research on oiliness for the Lubrication Committee. An inquiry is projected, in co-operation with the Local Government Board, into the properties of various building materials. Work has also been undertaken for other bodies—in many cases with the aid of a grant from the Research Department. For the Engineering Standards Committee, experiments are being made on methods of notched bar impact testing, on the efficiency of electric heaters and hot plates, and on the heating of the sockets of "Goliath" gas-filled lamp-holders, with various investigations relating to screw threads, &c. For the Institution of Mechanical Engineers, alloys research work is proceeding, together with an investigation on hardness. For the Institution of Electrical Engineers, inquiries are in progress into the heating of buried cables and the corrosion of lead-covered conductors. In the Heat Division, there has been an increase in the high-temperature test work—especially in the testing of optical and total radiation pyrometers—and some useful work has been done in connection with the high-temperature scale.

The report to the Director (Sir Richard Glazebrook, C.B., M.A., D.Sc., F.R.S.) on the Department of Metallurgy and Metallurgical Chemistry, contains a description and photograph of the extended foundry. This contains, among other apparatus, gas-heated metal-melting furnaces—a Fletcher-Russell injector-type, and a Richmond natural draught furnace. For the injector furnace, a special flue-pipe of carborundum mixture was made in the Laboratory; and this withstands very well the high temperature of the exhaust flame. High-pressure injector burners are placed in a separate room, having double doors; and furnaces are arranged on a special bench as required. There are other furnaces, both gas and electric. A recuperative gas-fired kiln is said to give extremely high temperatures, with a relatively low gas consumption; and the working is so simple that it can be left unattended for many hours.

Corrosion of Gas and Water Pipes.

An article dealing with the corrosion of gas and water pipes in clay soils containing calcium sulphate appeared (from the pen of Herr P. Medinger) in the "Journal für Gasbeleuchtung," Vol. LXI., p. 73. The following abstract of it is given in the current issue of the "Journal of the Society of Chemical Industry." Iron piping, especially cast iron, laid in clay soils containing calcium sulphate and bicarbonate, suffers unusually rapid corrosion, becoming soft and spongy without losing its form or changing its volume. In the case studied, most of the pipe had disintegrated, leaving a residue of iron in the metallic condition, graphite, and silicon, phosphorus, and sulphur in oxidized forms. The corrosion was apparently electrolytic, due to local action of iron and graphite couples, though the E.M.F. of this couple (0·6 volt) was much less than the decomposition potential of water. Even 0·1 volt suffices to cause current flow due to diffusion of ions, which prevents the establishment of permanent equilibrium. The concentration of H· ions from the bicarbonate is the deciding factor on the rate of corrosion. The addition of calcium sulphate increases the concentration of H· ions. The clayey character of the soil leads to an increased retention of the electrolytes which operate as above, and also to the exclusion of oxygen, which retards corrosion by the formation of a protective oxide layer and consequent interruption of current flow. In such soils it is recommended to lay the pipes in a layer of sand or porous earth. Care should be taken that the protective coating of paint, &c., on new pipes is intact, especially at any flanges which are more liable to abrasion.

THE GAS INDUSTRY'S RESTRICTIONS.

By THOS. NEWTON.

ALTHOUGH an unprejudiced survey of the present position and future prospects of the gas industry cannot fail to act as a stimulus to those who have the industry's best interests at heart, much spade-work requires to be done before the rate of progress can be accelerated. During the war, much has been accomplished, of which the industry and the nation have every reason to feel proud; but, unfortunately, the nation cannot properly appreciate the services which have thus been so fully and freely given—without thought of fee or reward—because all the facts have not yet been published. In spite of hampering restrictions, the gas industry has been altruistic to an appreciable extent; but the present (no less than the future) contains so many disturbing elements as to warrant a full investigation with a view to their speedy removal.

The time is now propitious for the adoption of a vigorous policy of action and assertion, not for an easy acquiescence in an aimless policy of drift. That the industry has suffered immensely on account of its war work being so little understood by the general public, is undoubted; and the present attitude of the official mind is not by any means encouraging. But these matters are capable of rectification as soon as sufficient determination is forthcoming. It is true that recognition has been made on exceedingly rare and conspicuous occasions; but these noteworthy exceptions to the general rule only emphasize the present contention. Certainly where anything in the nature of financial recognition is concerned, the industry's vital needs and pressing necessities have been only too often subordinated to an undiscerning officialism.

THE UNFAIR INCIDENCE OF CONTROLLED PRICES.

The unfair incidence of controlled prices is a case in point to illustrate what is meant. Assuming, for the sake of argument, that controlled prices under existing conditions are an imperative necessity. It is surely reasonable to expect that prices should be officially correlated. Coal, for example, is the principal raw material of gas-works' operations; but the controlled price of coal is allowed to advance—always advance—without any corresponding advance being allowed for any of its bye-products. The whole relationship of controlled prices so far as they affect gas undertakings, is thereby completely upset. Bye-products are still urgently required; but what is also urgently needed is some further financial recognition of the increased costs of production. That the incidence of controlled prices as they at present operate is unfair seems obvious to even the most casual observer.

The oft-recurring wages crises furnish additional evidence of this contention. Wages have been repeatedly advanced under direct Government auspices; but scant consideration has been shown by the Government with regard to the consequent advances in the cost of production which all gas undertakings are called upon to pay. Where, however, advances of wages have increased the cost of production of the commodities which form the raw materials of the gas industry, these increased costs are speedily reflected in enhanced prices. And, again, the gas undertakings are called upon to pay.

It surely is unreasonable to expect the industry to be constantly penalized without protesting; and an effectively organized protest is long overdue. What seems to be sorely lacking at the present juncture is the adequate preparation and the vigorous presentation of the case for consideration and re-adjustment.

LEGISLATIVE RESTRICTIONS.

The legislative restrictions now in force are to a great extent so many drags on the industry; and all that has hitherto been accomplished has been done in spite of them. Some of the restrictions now in vogue are so antiquated as to be altogether inapplicable to modern requirements; and they have unquestionably outlived their usefulness. All legislation on technical matters is largely a question of compromise; and the side which can present facts, figures, and arguments in the most convincing manner invariably obtains the best of the bargain. It has been stated that the community is best governed that is least governed. Recent events have demonstrated that too much government is not only embarassing, but exasperating. Complicated methods of procedure need simplifying; legislative broad-mindedness should be cultivated and encouraged; while meaningless formalities, and a rigid insistence on the adoption of unessentials, could very well be relegated to the scrap heap.

What is now abundantly clear is that the best interests of the community, no less than those of the gas industry, can effectively be served by a wholesale overhauling of the legislative restrictions which tend to fetter and thwart industrial development. The time spent in accomplishing the repeal of some, and the amendment of other, legislative encumbrances would be profitable in the sense that the industry would be free to develop along more progressive lines, and in keeping with a modernized economic environment—to the benefit of all concerned.

MORE PUBLICITY NEEDED.

Before, however, this ideal can be achieved, more publicity is needed. No good purpose is served by "hiding a light under a bushel." Gas undertakings have in the past exhibited too much tendency in this direction; while rival undertakings—less favour-

ably circumstanced in the economic production of their only commodity, which inevitably suffers fundamentally in comparison with gas—have set their "beacon on a hill," and shouted their wares from the housetop, on the principle that if a thing is sufficiently repeated some can always be relied upon to believe it.

The general public, and Parliament as well, need to be enlightened and educated concerning the domestic and industrial applications of gas; and the modern requirements of the gas industry should be emphasized on every possible occasion. In this connection, it is somewhat unfortunate that whenever Parliament has to be approached with reference to gas legislation, an atmosphere of suspicion, distrust, and misrepresentation must be dispelled before a just case can be presented. In the absence of a clear comprehension of the issues at stake, it is so very easy to attribute ulterior motives to those who seek the public good. The magnitude of the task only needs to be mentioned in order to be fully appreciated. But this serves to indicate the urgency of the problem, and the lee-way which has to be made up before progress can be recorded.

In the promising and unlimited future which undoubtedly lies immediately ahead of the gas industry, strenuous efforts should be made to eradicate every hindrance, obstacle, and encumbrance, so that the public generally may obtain at the lowest possible cost the best service of that gaseous commodity which best serves its purpose.

Coke and Coke Breeze for Boilers.

Among a number of matters which were discussed at the tenth annual congress in London of the Tramways and Light Railways Association [the proceedings at which are reported fully in the "Tramway and Railway World"], attention was given to the Coal Restriction Order; the use of coke or coke breeze being advocated as a means of obviating further curtailment of car services. Mr. W. E. Hardy (of the Bath Electric Tramways Company) pointed out that the successful burning of coke breeze had been, and was being, carried out on mechanical stokers, assisted with forced draught, and also on hand-fired furnaces with steam blowers. Personally, he did not advocate the use of steam blowers wherever they could be avoided. If, however, one was prepared to reduce the output per boiler, and make up by putting an additional boiler or boilers under steam, coke breeze could in most cases be burnt successfully on the existing furnaces, either by itself or mixed with coal. Where a boiler plant was working at its full capacity, of course the necessary margin was not available; but even in these cases there were times when the load was not so heavy, and it would often be found that a proportion of coke breeze could be burnt. In his own case, he had been able to reduce the coal consumption by about 50 p.ct. by burning coke breeze. He burnt it on a hand-fired furnace, and on chain-grate stokers with Babcock boilers. On the hand-fired furnace, burning coke breeze by itself, and with four-tenths of an inch draught at the boiler damper, he had found it to be possible to burn 13 lbs. of coke breeze per sq. ft. of grate area per hour, which gave considerably more than half the normal output of the boiler. On the chain-grate stoker fitted with a refractory arch, it was possible to obtain good ignition, burning one of coal and three of coke breeze by bulk. With the chain-grate stoker with an ordinary setting, one to one by bulk proved to be quite satisfactory. The first trials of coke breeze would probably not be regarded as satisfactory. Firemen were against it, and very often they put every obstacle in the way. But by a little persistency, and by starting in easy stages, it would be generally found that it would be possible in a very short space of time to increase the percentage of coke breeze burnt. Mr. A. L. C. Fell remarked that they were at present burning coke at the Greenwich generating station, and saving over 16 p.ct. of coal at the present time. They were burning coke in two ways—one was on underfeed stokers, and the other on ordinary chain-grate stokers with "Stirling" boilers. In this case, the coke and coal were being fed in layers. They had two shoots down from the hopper overhead; so that they fed the coal and coke at the same time, and they got a layer of coke underneath the coal, and secured very good results. He thought they were getting as high an economy as from ordinary coal; but one of the chief difficulties at the moment was with the underfeed stokers. The heat was so great in the furnaces that they had the greatest difficulty in keeping up the arches; and they had to be renewed very frequently. They hoped shortly to have the full results of the trials which were being made with these stokers. Several other speakers referred to the successful use of coke breeze.

Iron and Steel Scrap Disposal Order.—The Minister of Munitions has issued an Order providing that every person owning iron or steel scrap (whether metal, machinery, plant, or constructional steel or iron work) shall sell and transfer such scrap whenever required by the Controller, and the Controller's decision as to what is scrap shall be final. The Order further provides that if any such requirement to sell is not complied with within thirty days, the Controller may sell or transfer the scrap; the owners, in this event, receiving the price realized, less the cost of sale. Owners are to give all reasonable facilities for removal of material, and make such returns as may be required. All applications under the Order should be made to the Controller of Salvage and Stores, Ministry of Munitions, Whitehall Place, S.W. 1, marked "Iron and Steel Scrap."

THE GAS RATIONING ORDER, 1918.

Special Meeting of the Manchester District Institution.

Convened by the Manchester District Institution of Gas Engineers, a special meeting of the members was held in the Lord Mayor's Parlour, Town Hall, Manchester, on Thursday afternoon, the 15th inst., to consider the Household Fuel and Lighting Order, 1918. At the request of the Committee, Mr. Samuel Tagg, of Preston, consented to introduce and explain the details of the Order, with special reference to its application to the gas industry, and to answer questions on the subject. In view of the importance of the matter, it was decided to invite, in addition to the members of the Institution, the chairmen or any other representatives of the various undertakings throughout the district.

The PRESIDENT (Mr. J. P. Leather, of Burnley) explained that the Council of the Institution had considered the Household Fuel and Lighting Order so important in its relation to the gas industry, and as likely to throw upon the members of the Instituion, and the representatives generally of gas committees and gas companies, so much extra responsibility that it was desirable this meeting should be convened. The Order, it seemed to him, was so long, and contained so much that was not very easy—he would not say to understand, but to discern in what way it bore on the work of gas departments—that it seemed to the Council advisable that they should meet together so that they might have a better understanding, by mutual converse, and, by having some little explanation from those of their members who had given the Order more than an ordinary amount of study, be led into the work they had to do. No doubt the Order cast extra responsibility and extra work upon all charged with the conduct of gas undertakings.

NATIONAL GAS COUNCIL SUB-COMMITTEE.

The National Gas Council had been approached by the Board of Trade and the Coal Controller on the question of how the Order would affect "gas people;" and, as a result, a Special Sub-Committee had been appointed, who had discussed the Order, and tried to get it improved (as they hoped) by conversations with the Coal Controller and his Assistant. He was glad to say they had two members of the Sub-Committee there that afternoon—Mr. Samuel Tagg, of Preston, and Mr. H. E. Bloor, of York—and he would ask Mr. Tagg to introduce the subject. Before doing so, however, he desired to say he had had a note from Alderman Wm. Kay (the Chairman of the Manchester Gas Committee), who had intended to be present, regretting his inability to be with them. He desired to express their indebtedness to Alderman Kay, and also to the Lord Mayor of Manchester, for allowing them the use of the room.

Mr. SAMUEL TAGG prefaced his remarks by giving a comprehensive *resumé* of the facts which led to the present Order, which, he said, was in reality an extension of the Household Coal Distribution Order, 1917, issued for the Metropolitan area. In May, 1918, the Coal Controller proposed to fix the gas equivalent of a ton of coal at 13,500 c.ft., and to make the penalty for excessive consumption a surcharge of four times the value. The Committee of the National Gas Council pressed for the equivalent to be raised to 20,000 c.ft., and suggested that the rationing scheme should start on this assumption, because it was essential, in the national interest, to maintain the maximum output of gas. While, however, the Coal Controller did not accept the higher figure, he increased his own equivalent to 15,000 c.ft., and made it clear that it was his intention, if the effect of the Order was to reduce the consumption of gas beyond the figure he anticipated, to encourage the consumption by increasing the equivalent. The Coal Controller had accepted in principle a suggestion that the former gas consumption should be the starting point of the rationing scheme, though the consumer must have free choice as to taking his allowance in gaseous or solid fuel.

INCREASE IN GAS PRICES FORESHADOWED.

Mr. Tagg expressed the opinion that in residential areas householders would be unable to requisition for anything like the amount of their last year's consumption of gas; and in many cases difficulties would arise. Assistance would probably be needed by the householder in working out the equivalent and in allocating the coal to the best advantage. It was important that the quantity of coal carbonized in gas-works should be as high as possible; and every gas undertaking should, therefore, ascertain at the earliest possible moment, by totalling the requisitions, the probable effect of the Order on the output of gas. One consequence of a smaller output would be a higher price. Alluding to clause 7 of the Order:

> "The allowance of fuel to be taken as coal shall not be less in any case than two-and-a-half tons, except with the previous assent of the Local Fuel Overseer."

Mr. Tagg said this does not permit the Local Fuel Overseer to withhold his consent; and therefore the tenant of an "all-gas" house, who had been accustomed to take gas in large quantities, would be able to convert the whole of his coal into gas. As to the date of the enforcement of the Order, he (the speaker) strongly urged the need for ignoring the September quarter—the conference afterwards passed a resolution upon the subject—adding that, until the Local Fuel Overseers' certificates to householders are issued, gas and electricity undertakings must continue to supply consumers up to "previous normal consumption." As a matter of fact, Mr. Tagg added, householders at the present time were merrily consuming as much gas as, or even more than, a year ago. Many would eventually find that they must reduce their consumption by one-half; and it would be unfair to reckon against them the quantity of gas they had consumed while in ignorance of the restrictions of the Order. The matter had not yet been settled; but it seemed to him that the proper plan was to ignore the September quarter. As to whether washhouses or cellars which have in them washing-boilers should count as rooms, the decision rested

with the Local Fuel Overseers or the Local Fuel Committees. It was an acute question in many towns.

The PRESIDENT, replying to a question by Alderman Isherwood, J.P. (the Chairman of the Macclesfield Corporation Gas Committee), as to the position of a chairman of a gas committee on the Local Fuel Committee, said he could be on the committee *ex-officio*; but not being an independent person, he could not be on in the ordinary way.

Mr. TAGG said he thought he was as free to vote as any other member on ordinary questions; but only independent members could vote on matters involving expense by the local authority.

THE RESOLUTION.

On the proposition of Mr. J. H. BREARLEY (Longwood), seconded by Mr. S. MEUNIER (Stockport), the subjoined resolution was unanimously agreed to:—

That the Controller of Coal Mines be urged to exclude gas consumed during the September quarter from the operations of the Household Fuel and Lighting Order, 1918, for the following reasons:

(1) Gas consumers have been urged to use gas in place of coal for national reasons.
(2) Large numbers of consumers are saving all the coal they can obtain for the winter, and are cooking by gas, in the full belief that they are thereby assisting the Controller.
(3) As the result of (1) and (2) above, gas consumption for domestic purposes at the present time is greatly in excess of previous experience.
(4) Great hardship will be inflicted on a very large number of persons, if this exceptional quarter is debited against the first year's gas allowance under the Order.

Mr. W. A. NICHOLLS (the Chairman of the Stretford Gas Company) expressed himself very pleased with the words and tone of Mr. Tagg's address, and said it seemed to him that if the Local Fuel Overseer treated gas undertakings in the liberal spirit which had been indicated by Mr. Tagg, they would have very little cause for anxiety.

Mr. TAGG emphasized the importance of each gas engineer trying to cultivate friendly relations with the Local Fuel Overseer, and endeavouring to induce him to take a proper view of his duties. The gas engineer, he need hardly say, should cultivate the good feeling of the householders, and encourage them to go to him for information on certain points rather than to the Local Fuel Overseer. At the same time, he did not think they might expect any Fuel Overseer to be unfriendly towards them.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

The fifty-seventh annual meeting will be held on Friday, the 6th prox., in the Royal Philosophical Society's Hall, Bath Street, Glasgow, under the presidency of Mr. Robert Muir, of Galston, who will deliver his address. After this, Prof. J. W. Cobb, B.Sc., F.I.C., of Leeds University, will give a William Young Memorial Trust Lecture on "Carbonization Reactions." Transaction of general business will conclude the meeting.

Council's Annual Report.

The Council, in their report, state that the membership of the Association at June 30 was 249, as compared with 251 at the close of the previous year. There are 153 ordinary members, 10 associate members, 79 extraordinary members, and 7 honorary members. Intimation is made of the death of four ordinary members (Messrs. Andrew Napier, of Crieff, J. Naismith, of Lennoxtown, James Purves, of Ayr, and Francis Scott, of Galashiels).

NEW MEMBERS.

The following are recommended for membership.

Ordinary Members.—Robert Scott, of Kilmalcolm; Alex. Craig, of Kilwinning; Harold Robinson, of Annan; J. Richmond, of Penicuik; Jas. Barbour, of Saltcoats; Robert Barr, of Ardrossan; A. Young, of East Wemyss, Fife; John Ballantyne, of Hamilton; James Napier, of Crieff; John Brodie, of Couper-Angus; and John M'Donald, of Oban.

Extraordinary Members.—Messrs. John E. C. Chapman, of Glasgow; J. F. Sutherland, of Falkirk; J. C. Murray, of Midlothian; and Alex. T. Gray, of Glasgow.

Honorary Members.—George R. Hislop, of Paisley; William Fairweather, of Kilmarnock; and Prof. T. Gray, of Glasgow.

INSTITUTION OF GAS ENGINEERS DELEGATE.

Mr. Robert Muir, of Galston, has been appointed to represent the Association on the Council of the Institution of Gas Engineers for the year 1918-19.

COMMERCIAL SECTIONS.

Western District.—It is the general opinion of the members that the value and usefulness of the Commercial Section has never been more evident than during the past year, when the difficulties under which all gas undertakings are working have increased in severity. Meetings have been held monthly, at which the ever-changing problems brought about by war conditions have been discussed, with much profit to the members. The number of members is 49—two more than last year; and the meetings have been exceedingly well attended. Mr. James Dickson, of Johnstone, has made an exceedingly able and painstaking Chairman. (DAVID FULTON, *Hon. Secretary and Treasurer*).

North-Eastern District.—During the year 1917-18 there have been the usual number of meetings at different centres; and, considering the restricted train service, the attendances were on the whole satisfactory. The membership is about the same as the previous year. The interest in the Commercial Section was never stronger; and it is hoped that in the near future the membership will be considerably increased. While the subjects under discussion at the several meetings were quite up to those of the past, the question of coal supply received a large amount of attention. Early in the year 1917, the Coal Controller intimated that a re-organization scheme was to be introduced, and the whole country divided into districts or areas; and no coal was to be supplied from one area to another without a permit from the Controller. Under this scheme, the North-Eastern District was to be confined to Fifeshire coal only; being Area No. 19. Previously, gas-works north of Fifeshire only drew about 30 p.ct. of their supplies from that area. The largest proportion was from Lanarkshire; the remainder from the Lothians. Gas managers in this district were very much disturbed by the new arrangement; and a largely-attended meeting of representatives of both gas companies and corporations was held in Dundee, as a result of which a deputation was appointed and a memorandum drawn up and sent to the Controller, who also received the deputation in London, when the case was laid very fully before him. Though no promise was given that coal would be supplied from outside the area, there is no doubt that, as the result of the interview, the Coal and Coke Supplies Committee received instructions to give attention to complaints regarding certain qualities of coal not being suitable for gas-making, and to have other grievances removed. The poor quality of some of the coals, together with irregular deliveries, was the cause of considerable worry; and it says much for many of the managers that, considering the difficulties with which they were faced, they have been able to carry on through the winter. Further, all former contracts having been abrogated, the allocated coal was to be supplied at prices based on the rates ruling during 1913-14; also, the Controller granted an increase of 2s. 6d. per ton in September. These decisions, coming after estimates had been framed, caused considerable perturbation of mind among gas managers. In quite a number of cases, the price of gas had to be increased. (R. S. JOHNSTON, *Secretary*.)

ANALYST'S REPORT.

As official Analyst to your Association, I have to state that from date of my appointment in 1917 to the present, I have received the undernoted samples for analysis:

Thirteen samples of sulphate of ammonia, of which the maximum test yielded 25·58 p.ct. of ammonia, and the minimum 24·65 p.ct. Free acid, maximum, 0·22 p.ct.; minimum, *nil*.

Eight samples of spent oxide of iron, of which the maximum percentage of moisture was 31·56 p.ct., and the minimum 11·81 p.ct. Sulphur on dry basis, maximum, 63·7 p.ct.; minimum, 13·9 p.ct. Prussian blue on dry basis, maximum yield 30·30 p.ct.; minimum, 13·10 p.ct.

Eight samples of coke and coke breeze, of which the maximum percentage of moisture was 24·52 p.ct., and the minimum 6·75 p.ct. Ash, maximum, 27·30 p.ct.; minimum, 10·07 p.ct. B.Th.U., maximum, 13,750; minimum, 10,550.

Eight samples of gas, for complete analysis; one sample of paraffin oil, for naphthalene test; three samples of ammoniacal liquor, testing strength; one sample of crude benzol, for distillation tests; and one test at gas-works, testing calorific value of the gas.

G. H. GEMMELL, F.I.C.

BENEVOLENT FUND.

During the year, no applications for assistance from this fund were received. The amount at the credit of the fund is £827 9s. 5d.

Cast-Iron Scrap Order.—The Minister of Munitions has issued an Order controlling cast-iron scrap, and making an addition to the General Permit, dated November, 1916, fixing the maximum prices for various grades of this material. Certain additions to, and modifications of, the General Permit of 1916, and the subsequent modifications thereof, relating to second-hand rails and wrought-iron scrap, are also made. All communications in reference to the Order and modifications of permit should be addressed to the Controller of Iron and Steel Production, Room 101, Ministry of Munitions, No. 8, Northumberland Avenue.

Manchester and District Junior Gas Association.—Members are visiting the Partington Steel and Iron Company's works, Irlam, on Wednesday, the 4th prox., when there will also be a special meeting to consider an alteration in the rules increasing the subscription rate. The syllabus notifies four other meetings to take place during the session: Oct. 5, visit to the Altrincham Gas-Works, and a paper by Mr. J. B. Stewart, of Rochdale, on "Distribution Problems." Dec. 7, visit to the Wallasey Gas-Works, and a paper by Mr. W. H. Postlethwaite, of Salford, on "Efficiency of Boilers and Distribution." Feb. 1, 1919, visit to the National Gas-Engine Company's works, and a paper by Mr. C. J. Woodhead, of Huddersfield. April 5, general meeting. The Hon. Secretary, Mr. James Bridge, of Bolton, directs attention to the prize scheme inaugurated by Mr. Samuel Tagg in 1913, and points out that, in continuation of this scheme, Mr. Franklin Thorp has offered to award a prize for the 1918-19 session.

New Gas-Works at Augsburg.—Every care was taken that the æsthetic external appearance of the new gas-works at Augsburg should receive adequate consideration. The "Deutsche Bauzeitung," referring to the scheme, says the two old gas-works, dating respectively from 1848 and 1862, were old-fashioned, and together were only able to furnish 24,000 cubic metres daily; whereas the maximum daily demand had been 31,000 cubic metres. The new works are upon a fresh site at Oberhausen, and will make 50,000 cubic metres at first, and can be extended to make 200,000 cubic metres. The arrangements for handling, transporting, and storing the coal are very complete. The reinforced concrete coal bunkers have a capacity of 11,000 tons, so that there is 24 hours' supply for a daily production of 100,000 cubic metres of gas; while there is additional storage in the retort-house. An elevated electric transporter supplies the retort-house, where vertical retorts are installed. The total cost, inclusive of the purchase of the site, has been about £250,000.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

A Central Committee to Deal with Public Prejudice.

SIR,—May I say a few words in reference to Mr. Allard's letter in this week's "JOURNAL"?

The education of the consumers is, and should be, largely a matter for the individual gas undertakings which supply them. Business-like, courteous, willing service (free altogether from the "official" attitude that has too often characterized the relations between "monopoly" companies and their consumers), accompanied by frank publicity at all times, both by direct correspondence and by direct and indirect information in the local Press, will steadily build-up a public attitude towards the gas suppliers of a district that will stand the undertaking and the industry in good stead when the day of trial comes. The attitude of the general body of consumers in London, as distinct from the inequitable and narrow-minded policy of Spring Gardens, has afforded striking evidence of this fact in connection with the recent Bill. Anyone who remembers the public attitude towards gas in London 15 or 20 years ago can appreciate what it means to know that there has been no support by the general public of the London County Council in their attempt to debar the industry from obtaining reasonable relief from the hardships inflicted upon it during the war by the operation of the sliding-scale.

Such local creation of friendly relationships between supplier and consumer can, however, be greatly assisted, and a general knowledge of the possibilities of gas service, alike to the individual and the community, be widely diffused—and so form a background to local efforts—by combined action; and to this extent Mr. Allard is perfectly right. But he is evidently unaware of the large amount of work that has been, and is being, done on behalf of the industry in this direction by this Association—with ascertained important results. And not perhaps unnaturally is he so unaware, because by far the largest part of the work so accomplished is, of necessity, not advertised, and bears no mark of its origin when published. Moreover, much of the work done is not even published in any form—it consists in direct correspondence or the supply of correct information periodically to individuals in positions of importance.

If Mr. Allard and the directors and committees of every gas undertaking in the country could spare time to examine the detailed records of the work done by the editorial and secretarial branches of this Association's work, the list of undertakings subscribing 2s. 6d. per million cubic feet per annum to its funds would increase even more rapidly than, it is gratifying to report, it is at present increasing, even at the end of four years of war.

The existing organizations in the industry are quite equal to the necessary work of continuously assisting local undertakings to educate the public, if they are adequately supported financially. But, to return to my original point, nothing they can do can completely counteract the local effect of uncommercial and short-sighted policy on the part of the undertaking supplying any district. That such policy is still pursued in not a few districts is constantly evident to those dealing with the callers and the correspondence at this office. Happily, there is also ground for believing that a more progressive policy is steadily, if slowly, being adopted in all directions. On the further spread of enlightened commercial methods the future of the gas industry will depend in no small measure in the trying years before it. Where local ill-feeling is to be observed, let directors carefully investigate the day-to-day policy of dealing with the consumers in the district.

F. W. GOODENOUGH, Chairman of Executive,
British Commercial Gas Association.

47, Victoria Street, S.W., Aug. 24, 1918.

Local Authorities and the Statutory Undertakings Act.

SIR,—I notice that, in your last two issues, you state that local authorities wishing to obtain an increase of maximum price should bring their cases before the Board of Trade.

This is misleading, as the application should be made to the Local Government Board.

CHARLES E. BAKER, Secretary.

Municipal Gas-Works Committee, 35, Parliament Street, Westminster, S.W., Aug. 21, 1918.

[The reference to the Board of Trade appeared in the notice from the Executive Committee of the National Gas Council on p. 341. Of course, English companies make their applications to the Board of Trade.—ED. G.J.]

Measurement of Coal Gas, as Applied to Motor Vehicles.

SIR,—I feel sure that Mr. Gordon's views on "The Measurement of Coal Gas, as applied to Motor Vehicles," published in the "JOURNAL" for the 20th inst., will have been read with considerable interest and usefulness when considered from different points of view. It is good to note constructive criticism of different gas measuring appliances from the points of view of official procedure and commercial utility. This is really too big a question to be satisfactorily discussed in this manner; but I would like to point out a fact which I consider has been overlooked.

Mr. Gordon evidently regards the law as an obstacle in not admitting of a greater range of meters being used because statutory inspectors are not permitted to examine and test meters officially under different conditions of pressure and quantity per hour. Admitted, the inspector must apply the specified pressure and quantity per hour which alone is inadequate to reveal the capabilities of meters; and any meters found incorrect under these conditions shall not be stamped. Speaking for myself, my view is that inspectors have powers under the Sale of Gas Act, 1859, section 12, to apply other means than are specified, and base their decision on the results obtained thereby; for it is provided that any meter found to be capable of measuring or registering incorrectly by any means practically prevented in a good meter, shall not be stamped. But owing to the fact that any meter may be stamped if found to be correct under the specified conditions, it has become questionable by established practice to refuse to stamp any meter found incorrect by any other means. To apply other pressure and quantity per hour not specified would lead to different practice and dissatisfaction both officially and commercially. Were the Board of Trade to obtain powers to issue regulations based even on the present Act, it would be a step in the desired direction; for it would be fair to assume that sympathetic consideration would be given to the different interests and responsibilities.

F. COE.

Gas-Meter Testing Station, Fairfax Street, Nottingham, Aug. 22, 1918.

Brotherton's Naphthalene Extractor.

SIR,—In your issue of July 9 there appeared a drawing and description of Porteous and Whitelock's (Brotherton & Co.) naphthalene extractor. If imitation is the sincerest form of flattery, then the Scottish shale oil industry may be congratulated on having such a tribute paid to it by a firm so interested in a kindred industry and having such a high reputation as Messrs. Brotherton & Co., Ltd.

Patent specification No. 5227, of April 21, 1900, gives a drawing of apparatus for cooling mineral oils and separating solid paraffin therefrom, which differs in no essential feature from that given by Messrs. Brotherton & Co. There are some differences in detail—that these are improvements is questionable.

The Scottish apparatus referred to above (the patentees being W. Fraser and J. Bryson of the Pumpherston Oil Company) is, I understand, still in use after eighteen years. If a sense of honour did not forbid the patenting by an English firm of such an obvious imitation of the Scottish apparatus, surely a sense of humour might have prevented the exhibition of such flagrant copying of the very language of the Scottish specification, as is shown by the following parallel quotations:

Scottish (1900) Fraser & Bryson.	English (1918). Brotherton.
"so designed that the process . . . is continuous whilst in the event of choking or disablement of part of the apparatus such disabled part may be cut out and the process continued through the remaining portion.'	"so designed that the process . . . is continuous, while in the event of choking or disablement of any part of it the disabled part may be cut out and the process continued through the remainder."

Aug. 23, 1918.

"HONOUR TO WHOM HONOUR."

REGISTER OF PATENTS.

Low-Temperature Distillation of Solid Fuel for Power Production.—No. 117,290.

MERZ & M'LELLAN, of Victoria Street, Westminster, MICHIE, A. C., of Newcastle-upon-Tyne, and WEEKS, E. G., of Monkseaton, Northumberland.

No. 9817; July 6, 1917.

This invention relates to the use of solid fuel for large-scale power-production by the low-temperature distillation of the fuel with the consequent separation of the distillation products and the combustible gaseous and solid residues. The solid residues are here referred to as the "coke" or the "coke-product," the distillation products and combustible gaseous products as the "retort gases," and the combustible gases as the "power gases."

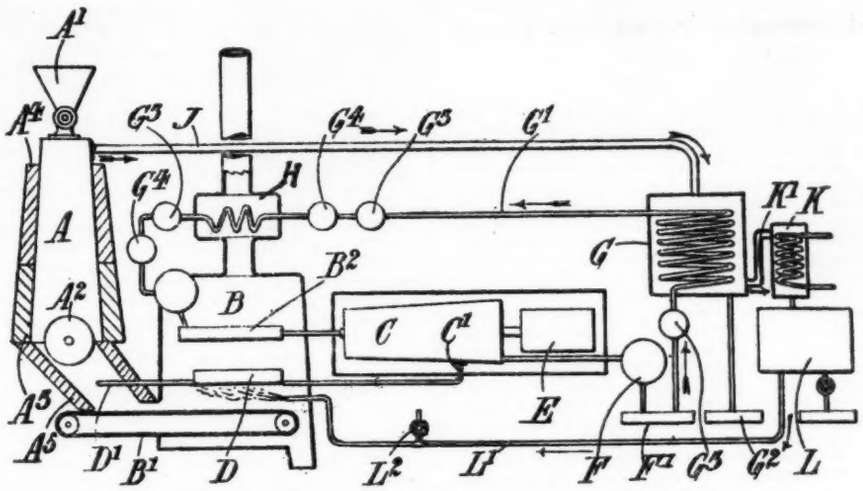
By the present invention, a combination of parts is provided to constitute means for producing power from solid fuel and to recover bye-products from the fuel, which parts comprise: (*a*) A substantially continuous steam-heated low-temperature distillation plant for solid fuel; (*b*) a hot-coke utilization plant consisting of a furnace and steam-boiler with or without auxiliary gas-producers; (*c*) means for utilizing for power production the power gases obtained from the distillation plant; (*d*) a steam-turbine power unit or units (with or without auxiliary internal combustion power units) with provision for the supply of bleed-steam* from the turbine units to the distillation plant; (*e*) a low-pressure superheater for heating the bleed-steam to the temperature required for distilling the fuel in the distillation plant; (*f*) means for heating the boiler feed-water for the steam-boiler by means of the recoverable heat (other than their heat of combustion) in the retort gases from the distillation plant.

The development of the energy by the means included in the item (*b*), and the transformations to which it is subsequently subjected, constitute a cycle of changes which are collectively referred to as "the main power cycle." Preferably the low-pressure superheater indicated in item (*e*) is so combined with a high-pressure superheater for the turbine units of item (*d*) as to constitute therewith a single apparatus built in as a unit into the boiler supplying the turbines. The power derived from the combustion of the power gases may be used, if desired, to supplement the main power cycle or in any other convenient and economical way.

The invention is described by reference to an embodiment illustrated diagrammatically.

The low-temperature distillation retort for treating coal is indicated at A; the retort being of gradually increasing diameter from the top downwards to permit the fuel to swell freely as it undergoes distilla-

* The term "bleed-steam" is clearly defined later on.



Merz and M'Lellan, Michie, and Weeks' Low-Temperature Distillation Process.

tion, and so avoid any choking of the fuel and steam in their passage through the retort. A continuous-feed hopper A^1 is provided for coal for the retort, and a continuous discharge device A^2 for the coke-product. The latter device may take the form of a feed-grate of known type, comprising toothed rollers geared together in pairs. The lowest and hottest portion of the retort A^3 is lagged with kieselguhr and a greater proportion of the upper part A^4 with magnesia.

The coke-product is discharged by the device A^2 into a closed and lagged feed trunk A^5, leading to the grate B^1 of the boiler B; any convenient form of mechanical stoker being employed to receive the coke product and feed it into the boiler-furnace. High-pressure steam from the boiler is fed through a high-pressure superheater B^2 to the high-pressure end of a steam-turbine C, from which bleed-steam is taken at the point C^1 and fed through a low-pressure superheater D in the boiler; the discharge from the superheater D serving to supply, through the pipe D^1, the steam required by the retort for distilling the coal.

The term "bleed-steam" is employed to denote steam taken from the casing of a turbine at a point intermediate between the ends of the turbine, at which point the steam has been partially expanded. It is well-known that by thus increasing the weight of high-pressure steam to be taken in by the turbine without increasing the total weight of steam discharged at the low-pressure end, the high-pressure blades may be made of longer radius, and the percentage of leakage, eddy losses, &c., reduced, with consequent increase of economy.

The turbine may be employed to drive any device E—such, for example, as a dynamo electric generator.

The exhaust steam from the turbine is taken to a condenser F, from whose hot-well F^1 the condensed water is pumped at G^3 through the retort-gas condenser G as cooling medium therefor, and thence through auxiliary feed-water heating devices such as are ordinarily employed—for example, through an economizer H and/or feed-water heaters G^4, back to the boiler B by way of the piping G^1.

Reverting to the retort A. The retort gases are taken by a discharge main J and passed through the device G, which serves not only as a condenser and cooler for the retort-gases, but also as a feed-water heater in the main power cycle. The distillates from the retort (here condensed to liquid form) are collected at G^2 for further treatment or sale; and the distillation products which still remain gaseous pass by a pipe K^1 to a cooler K, where they are finally cooled, and then passed to a gas-stripping plant L for the recovery of the light oils and other bye-products.

After this treatment, the power gases are fed to any utilization devices and are used for the production of steam and power, either (as indicated) by being passed to the furnace of the boiler B and there burned to assist in raising steam, or, if desired, by means of a pipe L^2 passed to internal-combustion engines or other heat-utilizing devices. In this way the gas is immediately utilized—that is to say, is not held in store nor transmitted a great distance before use.

The use of steam in the cycle of operations described is said to be advantageous, commercially and otherwise, for various reasons, among which are mentioned the following: The condensation and cooling of the gases prior to their entry into the stripping plant reduces their volume and thus the size of the stripping plant required; and, further, the use of steam as the distilling agent, and employed in such a way as to be put into direct contact with the fuel, appears to have a favourable effect as regards the character or volume of the distillates obtained. Other advantages afforded by the invention, by reason of the direct discharge of coke provided by it from the distillation plant to the furnace, comprise a saving of the heat contained in the coke and the avoidance of the combustion of it by combination with the air such as arises when the coke is discharged into the open air and allowed either to cool there or to undergo some degree of cooling before it is quenched.

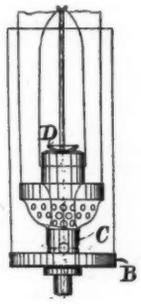
Incandescent Gas-Burners.—No. 117,477.

EDWARDS, E. A., of Southwick, Sussex.

No. 9003; Dec. 24, 1917.

The inventor proposes to make certain additions to existing types of upright incandescent gas-burners where the ingoing feed air for the bunsen passes between two concentric chimneys and prevents excessive radiation of heat.

B is a metal disc (with a lip to keep the outside chimney in place) approximately 2 in. larger than the outside diameter of the usual incandescent mantle apparatus. The disc is rigidly fixed to the lower end of the revolving air regulator C below the regulator air-holes. The disc can be turned round, so that the outside glass chimney (resting on the disc) and the air regulator have the same motion when



Edwards' Double Chimney Incandescent Burner.

revolved. This controls the air inlets from the outside. The disc B and the regulator C are made in one piece, and the outer glass chimney is of such a length as to reach from the disc to the same level as the top of the mantle—the top edge of the chimney, when in position, being approximately 3 in. below the top edge of the inner chimney. D is a small deflector on the upper part of the burner.

By this arrangement it is claimed that when the gas is lighted (drawing its feed air down the narrow space between the two chimneys) the air becomes heated and supplies heated air to the bunsen air holes and to the sides of the mantle.

Gas-Heaters.—No. 117,522.

LEWIS, W. I. G., of Tamworth.

No. 12,135; Aug. 23, 1917.

This heater is formed of a hollow perforated dome or ball of fire-clay or other similar material supported by a gallery, and provided with an arrangement for effecting the mixture of air with the gas as it passes into the dome—the improvements having for their object to provide a tube or chamber of similar material to that of the dome, and adapted to effect the mixing of the gas and air prior to the passing of the mixture into the dome, by which means it is claimed that the "cost of manufacture is reduced and the admixture of the gas and air prior to being superheated in the dome is more effectively accomplished."

Gas-Fired Water-Heaters.—No. 117,529.

TAYLOR, W. M., of Foley Street, W.

No. 12,850; Sept. 7, 1917.

This apparatus is of the kind wherein a twin spiral water-coil unit is supported to lie in a horizontal plane immediately above a gas-burner, consisting of a tube spirally coiled to occupy a horizontal plane, and wherein one or more single-pipe water-coil units are arranged individually in superposed position in closely adjacent horizontal planes above the twin water-coil unit next to the burner—for instance, as described in patent No. 22,370 of 1907. It consists in an "improved construction and arrangement of parts" the principal objects of which are "to reduce the cost of manufacture and to promote a better flow of water immediately above the gas-burner."

Utilization and Combustion of Fuel.—No. 117,637.

HELPS, G., of Nuneaton.

No. 16,709; Nov. 22, 1916.

According to this invention, "fuel (liquid and gaseous) may be so treated that its efficiency, when applied to heating and power purposes, is considerably improved."

In his patent No. 111,495, the advantages of the reduction of the calorific value of coal gas by dilution or degradation were set out by the inventor, as well as the application of flame in a thin layer. He says in his current specification that he has discovered that the application of gas to boilers in a series of flames around the inside of fire tubes or around the outside of the shell give immensely improved results compared with the application of one large gas-flame or a few large gas-flames inside a fire tube or flue.

As will be understood, he remarks, from his prior specification the chief advantages of using gas is that in a gas the solid is so finely divided-up that the necessary air containing the oxygen for its complete combustion can be so intermixed with it that the excess of air is reduced to a very small quantity, and thus waste of heat is avoided.

He continues: I have discovered that a number of small flames, which can be brought into intimate contact with the object to be heated, give a better duty than several larger flames; and I attribute this fact to the effect of the cool products of combustion after contact with the object to be heated mixing with the initial products of combustion and so cooling them. This effect cannot altogether be avoided; but it can be to a considerable extent. If the flame or source of heat be impinged on to (say) a boiler plate, the heat passes into the plate or through the plate to the water to be heated; and the products of the combustion—no longer flame—are consequently considerably reduced in temperature. If the flame is proportioned to the work it has to do, these products can be kept at such a temperature that they can do no further work at or near the flame they have passed from, because they are only just above the temperature to which the boiler plate has been heated. Consequently, if they are conducted away without being allowed to dilute other products that are considerably hotter than they are, great economy is effected. Such low temperature products can then be applied to feed-water heating, and their heat units utilized in this way. In a way this system may be likened to the use of steam in a compound or triple expansion engine. When the steam has done its work in the high-pressure cylinder, it is passed on to a larger cylinder, &c., and there further work is extracted from it. And when the flame or source of heat has been used in contact with a boiler plate, and it has imparted to the plate practically all the heat, it may be passed on to another boiler or feed-water heater working under lower temperature, and further heat extracted from it. In the case of feed-water heating, by arranging a proper travel of the water, almost the whole of the heat units can be taken up. This means the hotter products would come into contact with the hotter water, and the lower temperature products come in contact with the colder water, and so on—always remembering that the products must be hotter than the water or object to be heated. Hitherto gas has been applied to steam raising in boilers in one or two big flames applied lengthwise or parallel to the flue of the boiler, and only the outside edges of the flame have had any chance of coming into contact with the metal of the flue. The chief heating in such cases has been done with the hot products of the combustion emanating from the flame; and thus the rapidity of heat transference to the water has been considerably retarded, and the flues required have had to be of considerable length.

By the present invention, small coneless flames of gas are made to impinge directly on to the boiler plate to be heated at a right angle to it and the fire tube or flue of a boiler. The chief heating surface may be thus covered with a thin film of flame of a regulatable temperature, from which the heat is transferred quickly to the water; and the products of combustion from such flames may be drawn off before they dilute hotter gases by suitable means to a secondary boiler or feed-water heater. The supply of secondary air may also be regulated through special tubes or channels.

The burners employed may be of any convenient length having burner heads with small perforations on branch pieces at close intervals, or the burner head may be in one continuous length or chamber in which openings from the burner tube occur. The burner heads may be fitted in tubes of refractory material covering part of the burner tube and protecting it so that the heat from the combustion may not make the burner red hot or cause it to fire the admixture of gas and air in it. Such burners may be fitted inside the boiler tube or flue in various ways. One form of fitting them is by securing them to a carriage on rollers running on a level path in the tube, so arranged that the flames from the burners are in close contact with the soffit or inside arch of the flue. The burner tubes may be set concentrically in single or more rings and be all fed from one connection in the form of a drum at the end of the boiler flue. The products of the combustion after they leave the flames are conveyed into a central tube or conduit and drawn out by a fan through a water heater or a secondary boiler—the secondary boiler acting, if desired, as a feed-water heater automatically feeding the main boiler.

Purification of Commercial Benzol and Toluol from Thiophene.—No. 117,683.

DUTT, P. K., of the Leeds University, and HAMER, J. D., of Middleton, Leeds.

No. 10,786; July 27, 1917.

This process consists in the treatment of commercial benzol and toluol with chlorine, whereby compounds of thiophene and thiotolene with chlorine are formed; and these chloro-compounds having high boiling points can easily be removed from benzene and toluene by fractional distillation in any recognized manner.

The chlorination is effected by passing chlorine gas into the benzol or toluol in the cold, or by agitating the benzol or toluol with chlorine water, or by mixing the benzol or toluol with a solution of bleaching powder and a mineral acid, or such substances as evolve chlorine on treatment with an acid. At the end of the reaction (which is determined by the absence of free chlorine), the benzol or toluol is separated and washed with alkali and afterwards fractionally distilled. The amount of chlorine must be sufficient to convert all the thiophene and thiotolene into their chloro derivatives, in order to effect satisfactory separation—the amount being determined by analysis in each instance. About 1½ p.ct. of chlorine is sufficient to remove about 0·5 p.ct. of thiophene or thiotolene. The quantity of chlorine admitted is regulated by any known method.

The existing processes for the removal of these impurities from benzol and toluol, the patentees state, involve lengthy treatment attended with much loss in the yields of the pure products, whereas, by their particular process, the removal of the impurities—thiophene and thiotolene—is rapid, complete, and does not involve much loss in the yield of the pure products. And, furthermore, the residues consist of useful and valuable bye-products.

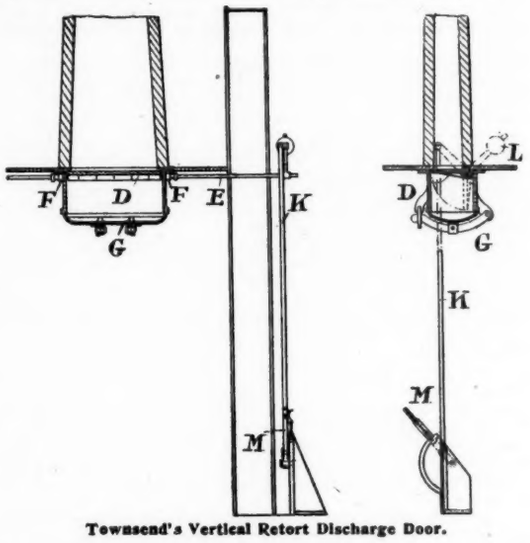
Intermittent Vertical Retorts.—No. 117,710.

TOWNSEND, W. W., of Colchester.

No. 12,089; Aug. 23, 1917.

With intermittent vertical retorts, as ordinarily constructed, the bottom is closed by a lid, and a small quantity of breeze is first dropped into the retort to fill the lid and the first few inches of the retort which are not hot enough to carbonize the coal. But the effect of dropping a charge of coal into it from a height is to pack the coal closely, "with the result that considerable resistance is offered to the passage of the gas through the charge, and at the lower end of the retort for the first few hours after charging the pressure of the gas is considerably above atmospheric pressure." A further effect of this tight packing of the charge is to produce a comparatively hard and dense coke.

In order to loosen the charge after it has been deposited in the retort—thereby allowing a freer passage for the gas to the outlet, and admitting of the production of a less dense coke—the patentee proposes to provide a relief chamber at the lower mouth of the retort which is capable of being shut off from the retort while being charged and afterwards put in communication with the retort to permit the charge to settle and assume a less densely-packed condition.



Townsend's Vertical Retort Discharge Door.

A vertical cross section on the major axis of the lower end of an intermittent vertical retort is given; also a vertical cross section on the minor axis.

The retort is (as usual) supported upon a cast-iron plate to which is bolted the mouthpiece, fitted with a mouthpiece lid G. A door D, to shut off the mouthpiece from the retort, is mounted on a shaft E, which is square in section in the portion fitted into the door, but is capable of being rotated to turn the door into the position shown in dotted lines—stuffing boxes F preventing any escape of gas where the shaft passes through the opposite walls of the mouthpiece as shown. The portion of the shaft at the left side is continued through other similar chambers attached to other retorts in the same row [not shown]. The other end of the shaft, continued outside the retort-bench, is fitted with a crank lever, one arm of which carries a counter-weight L, while the other is connected by a rod K with an operating lever M, mounted on a securely bolted stand.

In the closed position of the door D, the lever is locked by a catch arranged to engage a notched flange or quadrant on the stand. Instead of a hinged flap an adjustable stopper may be used, consisting of a plate secured to a spindle working through a stuffing box in the lower mouthpiece lid. The height of the plate when in the lower mouthpiece would be varied by moving the spindle vertically by levers or a rack-and-pinion; and when the lower mouthpiece lid is opened, the stopper would swing-back with it clear of the descending coke.

Coal cost upwards of £7000 extra at Warrington last year; and the further recent increase in price will mulct the undertaking in another £7000 this year. The Gas Engineer (Mr. W. S. Haddock) has told the Council it will be necessary to increase the price of gas, if the department is to meet current expenses.

MISCELLANEOUS NEWS.

COAL CONSERVATION COMMITTEE.

Final Report.

Some fuller notice may now be taken of the portions which more particularly concern the gas industry of the Coal Conservation Committee's final report, the forthcoming issue of which by the Ministry of Munitions was intimated in last Tuesday's "JOURNAL," when a summary was given of the main recommendations of the Committee. There were seventeen members of the Committee: Lord Haldane (Chairman), George Beilby, William A. Bone, W. Forster Brown, Guy Calthrop, Charles Carpenter, Arthur Cooper, J. S. Haldane, John Kemp, Charles H. Merz, Adam Nimmo. R. A. S. Redmayne, C. E. Rhodes, Robt. Smillie, Charles P. Sparks, A. Strahan, and Benj. Talbot. They were originally appointed in 1916, to consider:

(1) What improvements can be effected in the present methods of mining coal, with a view to prevent loss of coal in working and to minimize cost of production.

(2) What improvements can be effected in the present methods of using coal for the production of power, light, and heat, and of recovering bye-products, with a view to ensure the greatest possible economy in production and the most advantageous use of the coal substance.

(3) Whether, with a view to maintaining our industrial and commercial position, it is desirable that any steps should be taken in the near future, and if so what steps, to secure the development of new coalfields or extensions of coalfields already being worked.

Five Sub-Committees were appointed, with power to co-opt additional members; but at a later date two of them were amalgamated. All the reports received from these Sub-Committees are now submitted as forming, together with some preliminary explanations, the Committee's substantive report upon the whole of the questions referred to them. The first of the series is the interim report of the Power Generation and Transmission Sub-Committee, which was issued late last year, and referred to in the "JOURNAL" for Dec. 18 [p. 546] and Dec. 25 [p. 614], as well as on several other occasions. Next is the report of the Geological Sub-Committee, and then that of the Mining Sub-Committee, which contains the recommendation that a Ministry of Mines and Minerals be established.

In Part II. of the final report of the Mining Sub-Committee, consideration is given to the question of the possibility of finding extended markets for the class of small coal at present left underground. They summarize the views of leading South Wales exporters, and remark that among new factors likely to increase the demand for Welsh small coal is the erection of new fuel works, both in this country and abroad, and the advisability of washing the smalls cleaner. Given satisfactory methods of washing (and, in case of washed duff, of drying), there would appear to be little difficulty in disposing of any small coal now left in the mines. With regard to the demand for small coal for the manufacturing of patent fuel, they addressed a series of questions to the principal firms engaged in this industry; and the following conclusions are founded upon their replies:

(1) A considerable increase in the demand for patent fuel after the war is anticipated; and some firms are installing machinery to deal with the expected increase.

(2) At present the patent fuel industry would, if normal conditions of shipping, labour, &c., were restored, be able to absorb approximately 2,000,000 tons of Welsh small coal per annum. Small quantities are also briquetted in the Midlands and in Scotland.

(3) The coal at present used is almost exclusively of the type which has volatile content of from 10 to 22 p.ct.; the fuel being used for steam-raising purposes.

(4) The maximum percentage of ash permissible under present conditions is estimated at about 15 to 20 p.ct. in the unwashed coal, when clean washed small coal is available at a reasonable price for mixing. It is probable that, as the available supply of washed small coal increases, the proportion of unwashed coal used will be reduced; and it may be possible, under these circumstances, to deal with unwashed coal carrying a larger percentage of ash than that indicated.

(5) The Royal Commission on Coal Supplies (1903-1905) point to briquetting as one of the available methods by which small coal can be brought to bank and sold to advantage. Since the date of that report, the patent fuel industry has steadily developed; but the Committee are of opinion that a more determined effort should be made to encourage the consumption of patent fuel in the United Kingdom, both for steam-raising and domestic purposes, thereby achieving two objects:

(1) Inducing colliery owners to bring to bank more of the small coal.

(2) Setting free for export a greater quantity of large coal which, by reason of its higher price, is better able to bear heavy freights and meet German and American competition in oversea markets.

THE CARBONIZATION SUB-COMMITTEE.

The Carbonization Sub-Committee's report is signed George Beilby (Vice-Chairman), William A. Bone, Charles Carpenter, Arthur Cooper, J. S. Haldane, John Kemp, Charles H. Merz, R. A. S. Redmayne, and Benj. Talbot. It deals with the question of the application of carbonization to the preparation of fuel for domestic and industrial purposes. The main portions are reproduced.

PART I.

At a meeting of the Main Committee held on Jan. 31, 1917, the Carbonization and Metallurgical Sub-Committees asked permission to amalgamate into one Sub-Committee, which should be called the Carbonization Sub-Committee. This amalgamation was authorized.

As a result of a letter addressed to the Advisory Council for Scientific and Industrial Research on Aug. 11, 1916, by the Chairman of the Coal Conservation Sub-Committee, with reference to a Survey of the coal-seams of Great Britain, the Committee of Council established on Feb. 6, 1917, a Fuel Research Board, with Sir George Beilby as Director of Fuel Research. At a meeting of the Sub-Committee on March 27, 1917, the Vice-Chairman made a statement as to the proposed action of the Fuel Research Board with respect to (i.) the suggested chemical and physical survey of the coal-seams of Great Britain, and (ii.) the testing and development of methods of low-temperature carbonization.

The Sub-Committee were satisfied that the Fuel Research Board as set up by the Committee of Council were the proper body to carry out surveys and researches in connection with fuel, as they realized that work of this nature would require for its execution a properly qualified, whole-time staff, as well as financial and other resources which no unofficial body could hope to provide. In view of the taking over of this important work by the Fuel Research Board, the Sub-Committee re-considered their original programme, and decided on new lines of inquiry.

They have given much attention to the part which the carbonization of coal is calculated to play in reconstruction after the war; and in so doing, they have endeavoured to keep before them mainly the larger issues which are involved. From this standpoint, they consider that the problems ought to be stated in terms, first, of existing conditions and practice; second, of the extension and development of the best existing practice on lines which have already been proved technically and economically; and, third, development on lines which have been suggested, but have not yet been proved.

Under the term "carbonization," they have considered that all methods for the preparation or treatment of coal in its natural state as it is brought to the surface might have to be dealt with in any comprehensive schemes. The purpose of these methods of preparation may be regarded as threefold—

(*a*) To utilize more effectively coals which are at present marketed and consumed in the raw state.

(*b*) To make available for use products of the coal mine which are at present regarded as waste—*e.g.*, inferior coals, shales, small coal, and duff.

(*c*) By either (*a*) or (*b*) to add to the home supplies of the products of carbonization which at present need to be imported—*e.g.*, fuel oil for the Navy, motor spirit for use in transport by air, land, and sea, and the raw materials for the preparation of explosives, dyes, and drugs.

While the issues covered by (*b*) are of first-class importance from the national point of view, the Sub-Committee believe that the answers to the more fundamental problems will, in the first instance, be more easily and satisfactorily obtained in connection with the experimental inquiries which will be involved in the settlement of (*a*) and (*c*). If the technical and economic possibilities of artificial methods of preparation can be worked out and proved for the various types of coal as these are at present produced and marketed, the possibility of extending these methods to those products of the mine which are at present regarded as unsaleable will become a comparatively simple and straightforward problem. It is not contended that there should be no action in anticipation of the completed conclusions under (*a*) and (*c*) in the application of these to (*b*), but merely that the general procedure should follow the lines of an orderly development from the well known to the less known.

Combining the classification of the last two paragraphs, we have, in order of practicability, first, the application of the best existing practice to as large a proportion as possible of the present output of marketable coals; second, the proving of new methods and their application as in the first case; and, third, the application of the best methods, old and new, of dealing with these possible products of the coal-mine which at present are either neglected or wasted.

The preparation of raw coal by carbonization processes for use in domestic and industrial lighting and heating is almost entirely in the hands of two great branches of industry—gas making and coke making. In round figures, the amounts of coal carbonized annually in these industries are:

In gas-works, about 18 million tons.
In coke-works, over 20 million tons.

In gas-works, the primary object is to obtain from the coal carbonized the maximum yield of gas of standard quality; the coke, tar, and ammonia which are obtained being regarded as bye-products. In coke-works, hard metallurgical coke is the primary product; and the hydrocarbon gas, tar, and ammonia are the bye-products.

PART II.

The Gas Industry.

The gas industry has obtained the position it at present holds through a long course of evolution; and the methods and apparatus in use to-day mark a great advance on those in use even in the later decades of the last century. As with many other industries, the conditions brought about by the war have checked the natural flow of development. The resources of even the largest and best equipped gas-works are being strained to the utmost to meet the heavy demands, not only for an increased output of gas, but also for benzene, toluene, naphtha, creosote, and fuel oil. These extra demands have to be met in spite of increasing difficulty in obtaining supplies of coal of pre-war quality. The energy and forethought of the administrative and technical staffs of these concerns have necessarily to be concentrated on the immediate problems involved in the maintenance of output; and the natural course of improvement and development has in consequence been seriously checked, if not entirely suspended.

Under these circumstances, the Sub-Committee do not think that any useful purpose would be served by discussing here any suggested reforms and extensions of the gas industry. In the recently published report of the Fuel Research Board* it is pointed out that the scheme of research which it is proposed to carry out at the Central Fuel Research Station may have an important bearing on future developments in the gas industry; and the Sub-Committee concur in this view. By

* See "JOURNAL," Vol. CXL., pp. 128-30.

this work, it is hoped that the way may be prepared for the consideration of reconstruction schemes after the war.

Developments in this industry are also conditioned to a great extent by the fact that the right to distribute "town gas" is a monopoly secured by Acts of Parliament, and hedged round by the imposition of certain fixed standards of quality and price. "Town gas" is therefore legally, as well as technically, the principal product of the industry; and any proposed improvement in the processes or apparatus employed in its manufacture has to be scrutinized very closely from the point of view of the Acts of Parliament and standards and responsibilities involved in the supply of this particular product.

Important changes in these standards were made prior to, and early in, the war—notably in the relaxation of the older "sulphur clauses," in the substitution of a calorific for a photometric standard, and by the introduction of a stripping process for the recovery of benzene and toluene for war purposes.

Soon after their establishment, the Fuel Research Board were asked by the Board of Trade "to advise as to what is the most suitable composition and quality of gas and the minimum pressure at which it should generally be supplied, having regard to the desirability of economy in the use of coal, the adequate recovery of bye-products, and the purposes for which the gas is now used." The Fuel Research Board agreed to institute the necessary inquiries experimental and otherwise, and thereafter to advise the Board of Trade on the whole question, as set forth in the reference.

As the Vice-Chairman and other members of the Sub-Committee are officially concerned in this inquiry, the full discussion of gas manufacture and policy in this report is obviously inadvisable.

The Coke Industry.

The principal product of this industry is metallurgical coke, the greater part of which is used in blast-furnaces for the smelting and reduction of iron ore. The development of the coke industry is therefore closely knit-up with that of the iron and steel industries. It is a matter of common knowledge that every effort is being made to increase the output of iron and steel in Great Britain. While the immediate cause of this effort is the present shortage caused by war demands for ships, munitions, transport, and building construction, there can be no doubt that reconstruction after the war will make almost equally heavy demands on the production of iron and steel, and therefore on the production of coke.

The Sub-Committee realize that not merely the economical production of metallurgical coke, but also the more economical use of the other forms of fuel which result from carbonization in coke-ovens in the iron and steel industry, call for serious consideration at this time. They therefore asked two of their colleagues, Mr. Benjamin Talbot and Prof. W. A. Bone, to prepare special reports on these subjects. Mr. Talbot prepared a report on "Fuel Economy in a Modern Steel Works Unit," and Prof. Bone sent in a report on the "Manufacture of Metallurgical Coke in Great Britain." The Sub-Committee consider that these reports give an admirably clear presentation of the subjects with which they deal, and that they ought to be reproduced *in extenso* as appendices to this report. They will therefore be referred to here mainly in respect to their bearing on the larger aspects of reconstruction problems with which the Sub-Committee are dealing.

Prof. Bone's Report.

In Prof. Bone's report, earlier paragraphs define the qualities of good metallurgical coke, and explain the dependence of these qualities on the raw coal from which it is produced. The slow progress of the replacement of beehive by recovery oven coke is traced; the slow progress in this direction being apparently due to a rooted prejudice against its use in blast-furnaces. Comparison is made between beehive and recovery-oven coke as regards their physical properties and their suitability for iron smelting and steel melting, also as to the relative economy of the two methods of manufacture. The results obtained by Mr. Ernest Bury from the coking of the same kinds of coal by the two methods are given in tabular form. A net profit of 3s. 6d. per ton on bye-products alone is shown in favour of recovery oven coke. In addition to this, the recovery oven must be credited with a direct increase in the percentage of coke obtained from the coal carbonized.

Reference is made to the more important technical developments of recent years; and a table showing the yields of coke and bye-products obtained by the latest methods is given in the following form:

Percentage Yields calculated upon the Weight of Dry Coal Carbonized.

Locality of the Coal.	Coke.	Anhyd. Tar.	Crude Benzol.	Refined Benzol.	Ammonium Sulphate.
Durham . . .	75·0	3·85	0·93	0·56	1·16
South Yorkshire .	70·0	3·62	1·37	1·60	1 35
Lancashire . . .	70 0	3·50	1·20	0·54	1·25
South Wales . .	80·0	2·62	0·60	0·35	0 95
Scotland . . .	68·0	3·25	0·70	—	1·00

These results were obtained in Durham, South Yorkshire, Lancashire, South Wales, and Scotland, and may therefore be taken as widely representative.

Later paragraphs deal with figures showing the progress in the replacement of beehive by recovery ovens during the periods 1903-13 and 1914-15. The figures for 1916 are reproduced here.

Year.	In all Types of Ovens. Millions of Tons.		In Bye-Product Ovens. Millions of Tons.	
	Coal Carbonized.	Coke Made.	Coal Carbonized.	Coke Made.
1916. .	20·145	13·422	14·60	10·60

It thus appears probable that at the present time three-quarters of the coal carbonized for metallurgical coke in Great Britain is dealt with in bye-product ovens.

It is estimated that in November, 1917, some 8700 recovery ovens were ready for, or actually in, operation in Great Britain, and that a large number more were being erected. The output of the 8700 ovens already erected is estimated at 12¼ million tons of coke per annum, equal to 17½ million tons of coal carbonized. An estimate of the possible output of recovery-oven coke in the United States as at the end of 1917 shows that 25 million tons per annum is possible.

It is stated that Mr. T. C. Hutchinson, who for the past forty years has smelted Cleveland ironstone with Durham coke at Skinningrove Iron-Works, is satisfied that the change-over from beehive to recovery oven coke has not appreciably affected the coke consumption in the blast-furnaces. The average consumption of the Skinningrove furnames per ton of Cleveland pig iron is only 22·54 cwt. The coke is made in the Company's own recovery ovens from unwashed Durham coal containing an average of 10 to 11 p.ct. of ash.

After referring to the need for more highly-trained superintendents in modern coke-works, Prof. Bone concludes his report as follows: "In the case of bye-product plants which are built at collieries, and where the whole of the surplus gas and waste heat cannot be utilized on the spot—*i.e.*, for colliery power purposes, or in connection with steel manufacture or other chemical processes—it is very desirable that schemes should be devised for turning such residual gas or heat energy to good account, either (*a*) in connection with some public power scheme or, so far as the gas is concerned, (*b*) for public lighting or heating supplies. With regard to (*b*), it may be mentioned that several important towns in Rhineland and Westphalia (Barmen, Bochum, Bottrop, Cartrop, Essen, Gelsenkirchen, Heine, Mulheim, Oberhausen, Osterfeld, Wesel, Witten, &c.) are lighted with purified coke-oven gas. In this country, Middlesbrough is now similarly lighted by gas supplied from one of the neighbouring iron-works, while at the Birmingham Corporation Gas-Works bye-product coke-ovens, fired by means of Mond producer gas, have been erected for the production of metallurgical coke, gas, and residuals. In conclusion, the writer desires to draw the attention of the Sub-Committee to the importance to the whole coking industry of a systematic chemical survey of the principal British coking coals, and of the special reservation of the best of such seams in the future interest of our iron industry."

The future as well as the present needs of the nation for iron and steel are evidently reacting very powerfully on the output of metallurgical coke; and the figures quoted in Prof. Bone's report show that development is proceeding rapidly and on the right lines.

It has emerged during the discussion of the Sub-Committee that in the past large quantities of first-class coking coal have been shipped for bunker and other purposes. As the available resources in this class of coal are believed to be limited, it has been represented that this export involves a serious waste of the national resources. It has also been stated on behalf of the gas industry that this practice seriously affects the supplies of coal suitable for carbonization in that industry. The Sub-Committee desire to press upon the Main Committee the importance of this as a reconstruction question.

Referring to the last three paragraphs, the Main Committee, in their report, say they appreciate the importance of the question referred to in these paragraphs of the Carbonization Sub-Committee's report; but they are of opinion that this question raises economic problems of a far-reaching character, and that these problems lie beyond the scope of their reference. They therefore abstain from expressing any opinion on a subject which raises more than one point requiring careful investigation.

Fuel Economy in Iron and Steel Manufacture.

In this section, the Sub-Committee deal with Mr. Talbot's report, and remark: "The Sub-Committee are satisfied that a strong case has been made out on practical, as well as theoretical, grounds for the erection of combined units of a capacity of not less than 300,000 tons of finished steel per annum, and preferably of 500,000 tons. They further desire to record their approval of the suggestion that the grouping of these units in conveniently situated districts will be one of the most fundamental conditions of success. They have no doubt that the larger considerations of this kind are already fully in the minds of the able leaders of the iron and steel industries.

Power Production and Fuel Economy.

In the report of the Sub-Committee on Power Generation and Transmission, the question of fuel economy is dealt with mainly from the point of view of the generation of steam in large modern power-house units, in which coal is burned directly under the boilers.

In conferences between the Vice-Chairman of the Power Sub-Committee and the Vice-Chairman of this Committee, it was agreed that the introduction of carbonization and gasification processes for the preparation of the raw coal as a preliminary to its use for steam raising was still an open question, and that, pending fuller research on all the issues involved, the only practical course to follow in the planning of "super-power stations" was to leave room in the original lay-out for the introduction of carbonization or gasification plant, should it be subsequently proved that it would be feasible technically and economically to do so. In the report of the Fuel Research Board on their scheme of research and the establishment of a Fuel Research Station, considerable prominence was given to this subject; and the steps which it is proposed to take are clearly outlined.

While electric power engineers are practically agreed that the only feasible method of power production in large central stations is by the use of large turbo-generator units, the Sub-Committee consider that there is a definite field for the use of gas-engines in special circumstances and in cases where the most suitable units are of relatively small size—say, under 3000 to 4000 K.W. They hope and believe that the design and production of internal combustion engines will be greatly forwarded by researches which are already in progress; and that later, under the stimulus of reconstruction demands, important developments will take place both in the design and use of these engines.

PART III.

The Need for Properly-Trained Fuel Experts.

In conclusion, the Sub-Committee desire to express their strong conviction that the practical realization of more scientific methods for

the preparation and use of fuel will to a great extent depend on the creation of a body of scientifically and practically trained experts. Even in the large industrial concerns in which the annual fuel bill is an important item in the total expenditure, it is the exception to find an organized staff devoting their whole time to the control of the fuel consumption. Too often systematic control is altogether absent, or is relegated to the members of the engineering and process staff, whose best energies and attention are necessarily devoted to the running of machines and processes to which the supplies of fuel and power are regarded as merely incidental.

The evolution of new processes and apparatus is only a first step. The pressing forward of the practical adoption of these improvements in the industries concerned is of equal importance; and this can only be done by the personal effort of those who have been thoroughly imbued with their significance. The main point is that there must be a supply of trained experts. Whether these are to be employed as agents of a Government Department, as agents for the manufacturers of plant, or as members of the staff in industrial concerns, is a matter which can be safely left for future settlement.

The training of fuel experts must be practical, as well as academic. Certain modern universities and colleges have made provision for this academic training, and to some extent for more practical training; but up till now there have been only limited opportunities for the graduates of other institutions to complete their training by experience gained outside the lecture room and the laboratory. The Sub-Committee learn with satisfaction, therefore, that the Fuel Research Board hope to be in a position at their research station to give facilities for the higher training of those students and graduates from universities and colleges who have shown that they are specially fitted to follow this career.

BOURNEMOUTH GAS AND WATER COMPANY.

The Ordinary General Meeting of the Company was held last Friday, at the London Offices, No. 90, Cannon Street, E.C.—Mr. WILLIAM CASH, F.C.A., in the chair.

The SECRETARY (Mr. H. A. Plumb) read the notice calling the meeting; and the Directors' report and the accounts were taken as read.

THE LATE CHAIRMAN.

The CHAIRMAN, in moving the adoption of the report and accounts, said his first duty, before proceeding to the ordinary business of the meeting, was to refer to the fact that he found himself in the position he occupied that day. It was due to the death of their late esteemed Chairman and colleague, Mr. George Crispe Whiteley. As the proprietors knew, Mr. Whiteley had been Chairman of the Company for over twenty-two years, and had been a Director for upwards of thirty years. Those who knew him at the Board, and the proprietors who met him half-yearly, were always impressed by his kindly and genial manner. The whole time that he filled the position of Chairman, there was never any serious difference, or quarrel, or unpleasantness between him and his colleagues, or in his general dealings with anyone associated with the undertaking. He was also always anxious to cultivate, and to remain on, friendly relations with the local authorities and employees at Bournemouth. They all missed his presence. He was a most regular attendant at the meetings of the Board; and he laboured hard, over the long period of years mentioned, for the success of the concern. The proprietors would miss him at the half-yearly meetings. His eloquent and ready speech would always remain in their memories; and they all regretted the fact that they had parted with him, and would not see him again.

RESULTING CHANGES.

His (Mr. Cash's) colleagues had done him the honour of electing him to the chair—an honour he highly appreciated, because he had been connected with the Company all his business life. He followed his father as Secretary in 1891, and had been on the Board since 1909. He felt the responsibility of the honour that had now been done him; but the responsibility was lessened to a considerable degree by the fact that he had to assist him in the direction of the undertaking colleagues all of whom brought to the Board exceptional experience and special knowledge and qualifications for the task. To the vacancy on the Board, they had elected Mr. Honoratus Lloyd, K.C. He (the Chairman) supposed the proprietors all knew there was no gentleman who ranked higher in ability and experience at the Parliamentary Bar. He brought with him, too, experience that he gained as a Director of the South Metropolitan Gas Company; and this, combined with his other qualifications, would make him a colleague who would be of immense value to the Directors and of great service to the proprietors. They had now the unique advantage of having a Director of the Gas Light and Coke Company and of the South Metropolitan Company sitting at the same table. On behalf of the proprietors, he (the Chairman) welcomed Mr. Honoratus Lloyd, and hoped he would assist them in their deliberations for many years to come.

DIFFICULTIES OF THE HALF YEAR.

As to the half-year's report and accounts, he did not propose to detain the proprietors at any length by going through them in detail. Chairman after Chairman of the London and Provincial companies had been telling the story he (the Chairman) would only have to repeat there. The half year had been one of great difficulty in every direction for gas undertakings—and, mainly, under the three heads of coal, labour, and material. Coal had not been good in quality; and they had had to take such coal as had been offered to them. And their other main constituent, oil, had been very scarce and very dear. They had used less oil, principally because they had been unable to get it. On the other hand, the Company had obtained some relief from the higher cost of freight, because the coal had been this half year mainly railborne, and not brought to them by sea. They were also now working under the calorific standard, having the protection of the Order which the Ministry of Munitions had made as to the quality of gas. The effect of these three matters together had been, so far as this Company was concerned, that the actual cost of coal and oil, and of the coke supplied to the carburetted water-gas plant, had been slightly relieved, although they had made more gas than in the corresponding period of 1917.

THE LABOUR POSITION.

Turning now to labour, of course they had been working with a short staff, particularly on the clerical side and in the office; and labour had put forward increased demands in the shape of rates of pay. As the proprietors knew, the whole question of the rate of pay was dealt with by the Committee of Production as a national matter to which this Company were parties. Their men at the time were desirous of the matter being dealt with locally; and the Committee of Production were so informed. But it was ultimately decided that the Company were bound by the decision of the Committee, and that the men were similarly bound by the action of the various Unions that had appeared before the Committee. The advance which was granted was considerable. It dated back to March 21; and therefore the full effect of the additional charge had not yet been felt. Whether further applications would be made to this Committee, or to some other tribunal to be set-up to deal with these questions, he could not say at the moment. The celebrated Whitley report had been made to the Prime Minister; and he believed steps were being taken to establish sooner or later the necessary machinery outlined in that report to deal with these labour questions. It was hoped that under this new plan some at least of the questions might be negotiated in the first instance locally. Another large figure which appeared in the accounts was under the head of the maintenance of works. There the increase on the half year appeared almost alarming, and was, indeed, very substantial, because the total increase of the item alone was about £17,000. This, naturally, had given the Directors some concern; and they had been looking through the charges to ascertain how it was that so large an increase was essential. Without troubling the proprietors with great detail, he might say that during the half year they had carried out some heavy retort renewals at the Poole works, and had also spent a considerable sum on purchasing spare parts to safeguard against breakdown. Part of these were ordered some time ago, and had been delivered this half year. Increased wages accounted for a substantial proportion of it; and the cost of materials was very much greater than before. This applied more especially to retort materials that had been bought during the half year.

RATIONING, AND AN EXPLANATION AS TO AN INCREASE IN CONSUMPTION.

Another point upon which the proprietors might expect him to say a few words was as to the Rationing Order which was in force from the Lady-day quarter. The result had been perhaps what they might have expected, although at first blush it was a little curious they were able to report an increase in the gas sales in the half year of about 2¼ p.ct. This had been brought about in this way: Their ordinary and large consumers had reduced their consumption to quite a substantial extent. The prepayment consumers, on the other hand, who were not rationed where their consumption was below a certain limit, showed a substantially increased demand over the whole area. Therefore, taking the two together, the latter had outweighed the former.

GAS CHARGES AND DIVIDENDS.

The price of gas was raised at Lady-day; and the effect of this was to reduce the dividend on the original shares. He ought to explain that, under the Company's constitution, any increase in the price of gas for part of a year affected the dividend over the whole twelve months. Therefore, the Directors were only able to recommend a dividend of 11 p.ct. on the original shares, which was the class subject to the sliding-scale. A dividend was paid for the half year ending December last of 13 p.ct., and, with the 11 p.ct. now to be paid, this made the average 12 p.ct. for the year ending June—the year for the purpose of calculating the sliding-scale dividend terminating on June 30.

THE OUTLOOK.

As to the outlook for the coming half year, they would have to face the full effect of the increase of wages which had been lately granted; and they were likely to be confronted with further demands upon them in this direction. It was, of course, a matter of concern to them, as to other gas companies, that these continual demands were being pressed upon them. The natural result of these increased demands of labour not only in this industry, but other industries, was that they worked round in a vicious circle, raising the cost of living and other materials, so that they came back again to the workman as consumer paying for the advance which he had worked for and obtained from his employers. Just before June 30 the cost of coal was increased per ton by two sums, making together 4s. extra. They were told that there would be a shortage of coal, which would be met to some extent by rationing, and which they would have to deal with in their supply to the town. This new scheme of rationing was a matter of very great difficulty; but the Company like other companies would loyally do their best to co-operate with the authorities to carry-out the desire of the Coal Controller, and to reduce the consumption of coal. This would throw a great deal of work upon the Company's staff; and he could only ask the consumers to do their part as far as possible in economizing the consumption of fuel. He purposely said "in the consumption of fuel," because he would impress upon the consumers a fact of which they were probably already aware, that the most useful fuel they could burn was gas, because of the national advantages obtained from the residuals resulting from the carbonization of coal, which provided certain necessary materials for munitions required for the prosecution of the war. He was glad to see during the last few days that it seemed serious attention was being paid by the Coal Controller and those in authority to the increase of the output of the collieries. This really seemed to him to be the direction in which the endeavours of the Coal Controller might have been first made to meet the shortage rather than to begin by cutting-down the consumption by the drastic schemes which had been designed. He could only hope that these efforts at increasing the output might have some influence on the ultimate position in the coming winter. So far as the Company's means of supply were concerned, they hoped to have a portion of the Bourne Valley works available for the winter, although expen-

sive to operate. They would have to employ women labour there to a considerable extent. However, although the women worked well, and they were glad to acknowledge all that they had done, their physical capacity was not the same as that of a man. This was a fact with which they had to reckon. The real responsibility for the supply during the winter would lie with the Coal Controller, and not with the Company. They had done their best to accumulate stocks of coal; but they were told that some of their supplies would be diverted elsewhere—in fact there had already been some diversion. Whether at a later stage they would get these supplies returned to them, he could not say.

NEW WORKS IN PROSPECT.

As he said on the last occasion on which he had the pleasure of addressing the proprietors, the Directors had under consideration the question of the extension of the works and plant; and these matters were receiving their careful consideration. In connection with them, they were in communication with the local authorities, and the schemes might include not only the gas supply but the water supply. The consideration of the matter was not so far advanced that they could discuss them that day; but when they were ripe for action, they would be submitted to the proprietors.

"FINANCIAL HARDSHIPS"—PROSPECTIVE REVISION OF STATUTORY LIMITATIONS.

He might perhaps be allowed to say a few words with regard to a matter which had been in the minds of gas shareholders and consumers—that was, the question of financial hardships. Several of those sitting on his side of the table had been actively concerned in this matter. It had for the present found settlement in an Act of Parliament, which was known as the Statutory Undertakings (Temporary Increase of Charges) Act. The Act, however, did not afford any relief to this Company, because of the peculiarities of their constitution. But in connection with the matter, there was a very important statement by the President of the Board of Trade, who said it might be necessary after the war to review the past limitations—financial and otherwise—of statutory undertakings. In this connection, he should like to say that capital would after the war be scarce, and there would be keen competition for the amount which would be available, and capital would require increased remuneration just the same as labour did, which meant increased rates of interest for the use of money. The rates would undoubtedly be high; and therefore any question of revision would require great care. In his judgment, constant revision of the terms and constitution of a gas undertaking would have nothing but a disturbing effect. In this connection he ventured to hope that local authorities would not persist in an attitude of hostility to public utility undertakings, and would not attempt to deprive shareholders of the results which were due to them as remuneration for what had been done in bringing about, by skill and care in the management, the successful results which so many companies had attained. The gas capital which had been subscribed in the great majority of cases had been on terms which had involved the payment of high premiums by the shareholders—not in the open market, but to the companies themselves. In this connection, their own Company was a striking example. If they looked at the capital account, it would be seen that the premiums on the shares issued by the Company amounted to the very large sum of £206,352. This was equal to about 37 p.ct. of the whole of the subscribed capital; and if they took the dividend paid for the last twelve months, it worked out to a return on the money actually paid to the undertaking by the investor of less than 5¼ p.ct. Of this only a very small proportion was sliding-scale capital. But here, as in other companies, the sliding-scale was undoubtedly fixed to deal with normal times and normal fluctuations in the trade and business carried on, and was not designed to meet abnormal circumstances brought about by such a war as was now being waged.

AN APPEAL TO THE WORKMEN.

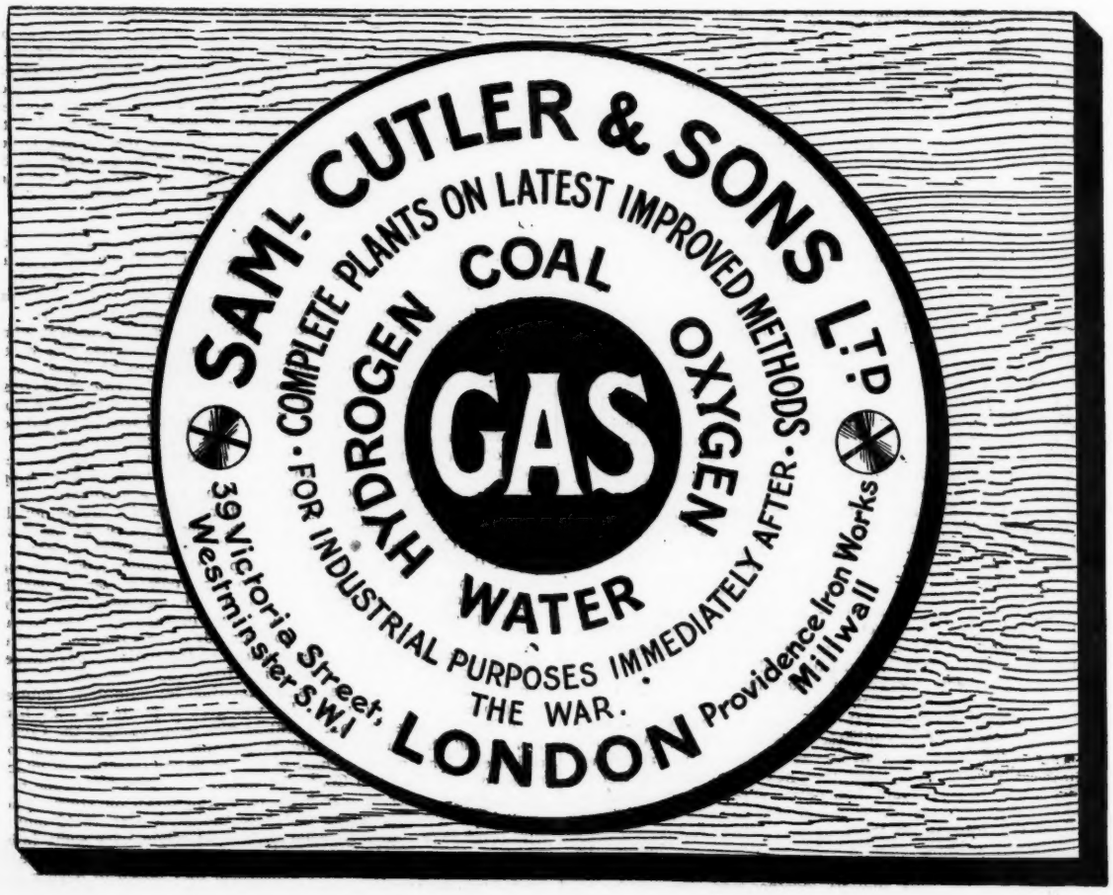
He should like to thank Mr. Moon and all the loyal workers with him at Bournemouth for all he and they had done during the half year. It had been a time of great difficulty and anxiety for Mr. Moon. The labour unrest undoubtedly had a disturbing influence on all the work he had to undertake. However the difficulties arose, and whatever they were, the Directors' sole anxiety was to deal fairly with the Company's workpeople, to pay them a reasonable and proper remuneration for their work, and to meet them to discuss questions that might occur from time to time. A number of the men were members of trade unions; and they could only hope that those who managed the trade unions would not direct their energies in endeavouring to create difficulties, but rather to smooth them away, and to help the Company and their men to work on an amicable and friendly basis. This was a time of sacrifice for every man while the war was raging; and while the Directors were anxious to avoid all hardship, it must be remembered that hardships must fall on the workers as well as on the shareholders and consumers, and must be borne equally.

THOSE AT THE FRONT.

With regard to the men at the front, 160 of the co-partner employees were actually serving in His Majesty's Forces; and four had during the past half year made the supreme sacrifice. The Directors and shareholders sympathized with their relatives and friends; and they could only hope that the time was not far distant when those remaining would return home, and with them their Chief Engineer and General Manager (Colonel Woodall), who was still in India, but not absent from their thoughts that day.

The Finance Act and Obsolescent Machinery.

The Rt. Hon. Sir Daniel F. Goddard, M.P., in seconding, said there was just one item in the accounts to which the Chairman had alluded, and about which he might say a few words. This was the expenditure on repairs and maintenance of works. Personally, he did not feel alarmed at this. He was always satisfied to see a considerable amount expended on the maintenance of works, because he



was sure it was money well expended. It should be borne in mind that plant used in gas-works nowadays was ever increasingly of the machine kind; and machinery would wear out—it could not last for ever. There were two ways of dealing with this plant—one was by writing it off regularly from time to time; and the other was by maintaining it up to its highest quality or efficiency. The Revenue Authorities had not hitherto allowed gas companies to write-off very much from machinery and plant in their balance-sheets. Therefore, they could not treat the matter as an ordinary trading concern would do; and so had to meet it by charging a larger sum by way of renewals and maintenance. At certain times, large blocks of plant came out of use, and had to be renewed; and this was apt to make the charge somewhat fluctuating. He thought that in the future this would be managed more considerately, because in the Finance Act of the past session, provision was made for an allowance for obsolescent machinery and so forth, which had not hitherto been allowed in the case of such undertakings as theirs. But in the future, as he gathered, they would be able to make regular depreciation on account of obsolescent plant, so that they would not have to spend quite so much on repairs and maintenance. He had had an opportunity of inspecting the works at Bournemouth quite recently, and he then saw the large amount of repairs and maintenance in hand. The works were in excellent condition; and they had every reason to be satisfied with them.

The Dividends and the New Director.

The CHAIRMAN moved the declaration of dividends at the following rates per annum, all less income-tax: 11 p.ct. on the original shares, 7 p.ct. on the "B" ordinary shares, and 6 p.ct. on the preference shares.

Mr. E. HONORATUS LLOYD, K.C., in seconding, asked to be allowed to allude to the Chairman's very kind words with reference to the introduction of himself as a Director of the Company. He might be unknown to many of the proprietors personally; but it so happened that, on being invited to join the Board (which he did with great pleasure), he found everyone of the Directors had been friends of his in one way or another. He was also acquainted with their late esteemed Chairman for nearly half a century. He had had to spend a great deal of time and energy in connection with gas and water undertakings, so he had acquired some experience in relation to such concerns. It was kind of Mr. Cash to refer to him in the flattering terms he did; and he hoped the proprietors would believe he was willing and anxious to devote the best attention and energy he possessed so that there would be truth in the words that had been used, and that he might be of some assistance to the Board and to the proprietors generally.

The motion was unanimously carried.

A Vote of Thanks.

Mr. A. W. OKE, in proposing a vote of thanks to the Chairman and Directors and to the officers and staffs in Bournemouth and London, and to the employees generally, alluded to the loss the proprietors had sustained by the death of their late Chairman. He also congratulated Mr. Cash upon his promotion to the chair, and subsequently referred to the distinguished services rendered by Mr. Moon and his staff, as well as by the Secretary and the London staff.

Mr. F. H. PILLEY, in seconding the motion, asked that the Directors should communicate to the family of their late Chairman their sincere feelings of regard, regret, and sympathy.

The motion was unanimously carried.

The CHAIRMAN, in responding for the Board, said they had already sent a message of sympathy to Mrs. Whiteley and the family; and he was sure they would greatly appreciate a similar message from the proprietors. The Board fully concurred in the appreciative remarks that had been made regarding the officers and the loyal workers at Bournemouth and in London.

Mr. P. G. G. MOON (Acting Engineer and General Manager) thanked the proprietors on behalf of himself and all whom he represented. Like the staffs of all other gas companies, they had passed through trying times; and that they had been able to do so as successfully as they had was because of the loyal co-operation he had received personally and the Company generally from the whole of the staff at Bournemouth. They were zealous, anxious, and ever-ready to do all they could to forward the best interests of the Company. Speaking for the staff, he should also like to add their tribute of respect for their late Chairman, and sympathy with those left behind. They felt that they had lost a very sincere friend. He could assure their new Chairman that they would all work as zealously under him as they did under Mr. Whiteley. A few words as to their chief, Colonel Woodall. In his work in India, he was just as indefatigable as he was in his work for the Company. As an illustration, he might say that although, after three-and-a-half years' strenuous work in the very trying climate of India, his leave was now due, he had volunteered for service during the holidays at Simla; and this had been accepted. It would take him into the hot Indian plains right in the middle of the hot season. This was a very good example of how keen, even in India under trying conditions, he still was.

Mr. PLUMB, on behalf of his staff and himself, also acknowledged the vote.

Winchester Water and Gas Company.—The balance of net revenue account, for the six months ended June 30, available for dividend is £9072; and the Directors recommend the payment of a dividend on the preference stock at the rate of 4 p.ct. per annum, and on the consolidated ordinary stock at the rate of 4¼ p.ct. per annum—less income-tax. They view with anxiety the probable effect on the Company's business of the advance of 4s. per ton on all coal supplied after the beginning of July, and of the Household Fuel and Lighting Order. Reasonable provision has been made for necessary repairs which it has been impossible to carry out during the half year.

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CROYDON GAS COMPANY.

A Satisfactory Half Year.

The One Hundred and Forty-Third Half-Yearly General Meeting was held at the Company's offices, Katharine Street, Croydon, last Friday—Mr. Charles Hussey, J.P. (the Chairman), presiding.

The Chairman, in moving the adoption of the report and statement of accounts—noticed last week, p. 363—said they might be regarded as satisfactory, considering the circumstances under which they had had to work during the half year. The cost of coal, oil, and materials generally had continuously increased. Taking the two former alone—coal and oil—the increases in price, as against a year ago, calculated on the quantities used in the half year, represented a sum of over £16,000; while an additional £900 had been paid out in wages and war bonus. They had been able to secure no gain from residuals to set against this. The figures quoted, when taken together, amounted to just under 7d. per 1000 c.ft., and the advance made in the price of gas was from 3s. 1d. to 3s. 6d. per 1000 c.ft. only; while they had set aside a sum of £5000 towards the further burden of the current half year in the matter of price of coals. Yet the dividend had been earned, with a margin of £1500. Two main causes had contributed to this satisfactory result. Firstly, the carbonizing results had been satisfactory to a greater extent than they felt able to count upon; and for this achievement their Engineer, Mr. Caddick, and the staff and workmen at Waddon were to be congratulated. It had not been done without anxious and continuous work. He was sorry to say that Mr. Caddick had suffered a breakdown in health, which would necessitate his taking complete rest for some weeks. Secondly, there was a considerable reduction of expenditure under the heading "distribution of gas." This was not due to neglect of plant or inattention to the consumers' needs, but to the fact that the work usually carried out in extending their business was perforce almost at a standstill. They were not allowed to fix additional appliances for the use of gas, even if it were possible to obtain them. The Directors regretted that during the half year they had to increase the price of gas by a further 3d., from July. He hoped, however, they might be nearing the point when they could announce reductions. Many neighbouring gas companies were intimating that another increase from Michaelmas would be necessary; and he could not say with certainty that they would be able to avoid taking this unwelcome course. In regard to the increased cost of coal and freights, together these amounted to a rise of 28s. per ton, which, at 12,000 c.ft. to the ton, was equal to 2s. 4d. per 1000 c.ft. The advances they had made in the price of gas had been in all from 2s. 5d. to 3s. 9d., or 1s. 4d. per 1000 c.ft. As to their stocks of coal, this year they were not quite so favourably situated as last, though they had a fairly substantial reserve stock. Referring to the steps which had been taken to render available an increased productive capacity by bringing up to date a retort-house which had been disused for some time, he regretted that the necessary Government sanction for this work had been refused. They would therefore have to face the coming winter with no increase of their manufacturing plant. Dealing with the new Household Fuel and Lighting Order, he thought it would be wise to anticipate some diminution in their sales, which meant some increase in their costs expressed in terms of per 1000 c.ft. The experience of the half year just ended, as compared with a year ago, showed that the average rate of consumption of their larger consumers (those having quarterly meters), after eliminating the increase due to the requirements of munition works, had decreased by about 8 p.ct. The rate of consumption of the smaller consumers had, however, increased by about 6 p.ct., though it was well under the ration-free allowance provided in the Coal Controller's scheme. In regard to the Financial Hardships Act, in their own case they did not anticipate having to seek the relief which might be given. It would not become operative unless circumstances became much more unfavourable than they so far showed any indications of doing. This was due in part to the nature of their "sliding-scale" provisions, and in part to the fact that in past years the proprietors had been content to divide a less sum than the regulations governing the Company's finance would have permitted them to do. The dividends proposed would leave them with an undivided balance of £4309 to carry forward.

The report and accounts were unanimously adopted.

The Dividends.

Mr. W. Cash proposed the payment of the dividends which they would gather from the remarks of the Chairman they had been able to earn.

Mr. Henry Woodall, in seconding the proposition, said he was able to tell the shareholders that, although they had not been able to increase their manufacturing plant as they should like, he had just been over the works and they were in excellent condition.

The resolution was unanimously agreed to.

Vote of Thanks.

The Chairman, in acknowledging a vote of thanks, said the past half year had been an anxious time. It seemed to the Directors very extraordinary that, after the Government had requested gas companies to produce necessary material, when they asked for any little concession to enable them to do it—when they asked to be allowed to alter a retort-house, because if they had a sharp winter they would be in a serious position—they were not allowed to do it. Proposing a vote of thanks to the staff and workmen, he said that Mr. Caddick, their Engineer and Works Manager, had broken down in health. He had gone to the seaside; and although they had been anxious that he should go further away than he had done, he wished to keep in touch with the works and Mr. Tatam, the Second Engineer. He was pleased to say that their relations with the workmen and workwomen were of the happiest nature.

The resolution was carried unanimously, and acknowledged by Mr. W. W. Topley, Mr. W. J. Sandeman, and Mr. G. W. Tatam.

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BOLTON GAS DEPARTMENT ACCOUNTS.

In their report to the Town Council on the working of the department for the year ended March 31, the Bolton Gas Committee state that the balance of the revenue account shows a gross profit of £67,495, which is an increase of £18,986 over the previous year. The sum of £10,000 has been placed to the depreciation and renewals fund, and £6380 to revenue contributions to capital, leaving a balance of £3696 (or £3213 more than last year) to be carried forward. The cost of gas into the holder was less than in the preceding twelve months, in spite of the higher cost of materials and wages. The Ministry of Munitions have asked for the use of the Lum Street works for the production of fuel oil; and the Committee have acquiesced subject to a suitable agreement being made.

The total quantity of gas sold shows an increase of 5,326,000 c.ft. over 1917, and a decrease of 128,000,000 c.ft. over 1914. This reduction on total gas consumed since 1914 can be attributed to decreased street lighting, daylight saving, and war conditions generally. The consumption for industrial purposes shows an increase of 7,000,000 c.ft. The coal supplied during the past year was again of inferior quality as compared with pre-war deliveries, resulting in a reduced production of residuals. However, by improved methods of carbonization, the make of gas per ton shows an increase, despite the extraction of benzol and toluol for Government requirements. The results achieved may, in the circumstances, be considered as highly satisfactory. The increased cost of materials and wages for 1918, as compared with 1917, was £13,420. The income received from gas shows an increase of 3·72d. per 1000 c.ft. sold. This represents an increase on the total gas sold in 1918 of £14,494. The revenue from residuals is more by £8678 than in the previous year.

The report (which is signed by Mr. W. Heaps, the Chairman of the Committee) contains the following comparative statistics.

	1918.		1917.
Tons of coal and cannel carbonized .	88,157	..	92,196
Average cost per ton	20s. 2¼d.	..	18s. 11¾d.
Percentage of cannel used	0·47	..	0·00
Gas made, in cubic feet	988,424,000	..	968,973,000
Do. do. per ton carbonized	11,212	..	10,510
Gas accounted for in cubic feet per ton carbonized	10,810	..	10,255
Gas unaccounted for per cent. through leakage and condensation . . .	3·58	..	2·42
Maximum quantity of gas supplied in 24 hours during the year, cubic feet .	5,240,000	..	5,350,000
Minimum quantity do do.	1,060,000	..	959,000

Waterford Gas Company.—The Directors of the Waterford Gas Company have declared a dividend at the rate of 5 p.ct. per annum, written £1100 off investments, and carried forward £9380.

PATENT OFFICE REPORT.

Some increase in business during the year 1917, judged from the point of view of the number of applications by inventors for protection, is indicated in the thirty-fifth report of the Comptroller-General of Patents, &c. (Mr. W. Temple Franks). The years 1915 and 1916 witnessed a very heavy drop in this direction, when compared with the last pre-war decade; the applications in any one year having dropped from 30,603 in 1909, to 18,191 in 1915. In 1916 there was an upward curve to 18,602; and last year, this tendency was maintained, with a rise to 19,285 applications. In 1916, the number of provisional specifications was 13,641, and in 1917 it was 13,990; the complete specifications filed in the two years being numbered respectively 10,700 and 11,[illegible]90, and the number of patents sealed 8424 and 9347. The receipts from patents fees last year were £202,215, which was an increase of £24,075 over the previous year. As to receipts, there was a surplus over expenditure of £124,427, as against £107,492 in 1916.

Of the 19,285 applications filed in 1917, 253 were received from women inventors; while applications made by way of communications from abroad numbered 927, as compared with 835 the year before. Under the provisions of the International Convention for the Protection of Industrial Property, 1661 applications were made in this country, which was an increase of 261. Fifteen applications were made for the restoration of patents which had lapsed in consequence of the non-payment of renewal fees. In ten cases the patent was restored; one was withdrawn; and four were still pending when the report was prepared. Under the power which the Comptroller has to revoke a patent upon application made within two years from the date of the patent by any person who would have been entitled to oppose its grant, there were seven applications, four of which are still undecided. Of the remainder, one was dismissed; and in two cases orders were made requiring an amendment of the patentee's specification. There were lodged during the year four petitions for extensions of term of patents; but none of the cases has yet been decided. Altogether there are now only six patents in force which have been prolonged beyond the normal period of fourteen years.

As to the emergency legislation which has resulted from the war, in the course of the past twelve months there were 223 applications made for the avoidance or suspension of patent rights. In about 80 p.ct. of the cases licences have been, or will be, granted; and in three instances the patents have been suspended in favour of the applicants. Some of the others have been withdrawn, or are not yet decided. Under the provisions of the Trading with the Enemy Amendment Act, 1916, orders have been made vesting in the Custodian the benefit of over 2000 applications for patents made by or for enemy subjects; and patents have been sealed to the Custodian on these applications. There were 91 applications for the grant of licences under such patents; and, with the exception of a few which have been abandoned, these licences will be granted. At the beginning of the war, arrangements were

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made by which notifications and documents relating to foreign patents could be deposited in the Patent Office, at the depositor's risk, and without any guarantee that this procedure would be recognized by the foreign patent office, for the purpose of recording the intention on the part of the depositor to do some act or to file some document on a certain date at a foreign patent office with which communication was difficult or impossible owing to the war. The number of notifications deposited under these arrangements in 1917 was 346.

REPORT ON EXPLOSIVES.

That the year 1917 was a busy one for the Department, is shown by the forty-second annual report of the Inspectors of Explosives; but the greater part of the work done does not, of course, call for special notice here. Mention is made of a considerable amount of Committee work; one or more of the Inspectors having served on (among others) the Committee appointed in connection with the compression of acetylene into cylinders containing a porous substance, and the Committee inquiring into the use of coal gas as a substitute for petrol.

In August, there was repealed the Order in Council dated June 11, 1910, which exempted tri-nitro-toluol from the main provisions of the Explosives Act; and one result of this is to render the manufacture of tri-nitro-toluol in trade factories illegal, except by virtue of a licence. Licences have accordingly been issued in respect of the factories where suitable conditions obtain. The storage, conveyance, and importation of this material are also now subject to the requirements of the Act and Orders made under it; but, in order to retain the use of existing packages and avoid the labour of re-marking them, permission has been given to manufacturers for each package to contain 56 lbs. instead of 50 lbs., and exemption has been granted from the requirement that every package shall be marked "Explosive"—provided it is conspicuously marked "T.N.T.," and is consigned to the Government.

There was an accident in February at the Manchester carbide factory of British Carbides, Ltd. Particulars furnished are to the effect that, while attempting to re-start the furnace after it had been standing idle for some time owing to lack of raw material, part of the wall gave way, and some tons of molten carbide ran out over the floor. The only inflammable material in the place was the wooden steps leading to the furnace; and the burning of these was the only damage done. Though there were some tons of carbide on the cooling floors, and packing was going on, little inconvenience was occasioned. It is remarked in the report that the result of this accident "would seem to justify the view that, in a suitably constructed factory, the risk attached to the manufacture of this essential commodity is by no means serious."

Several workmen were severely injured as the result of an explosion in an acetylene holder at Messrs. Vickers' Sheffield works, owing to the introduction of compressed air or possibly oxygen for the purpose of raising the holder. On acetylene being then supplied, a backfire from the blowpipe—a not infrequent occurrence, it is pointed out—would very probably cause an explosion.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Aug.* 26.

In the London tar products market pitch continues in active demand, and the price is firm at about 62s. 6d. per ton net in bulk at makers' works. A fair number of shipments are being made. Tar oils and tar mixtures are in good request on the Government terms. In other products, there is nothing of particular interest to record.

All available supplies of sulphate of ammonia are readily taken up, and the demand for this article at present exceeds the supply.

Tar Products in the Provinces.

Aug. 26.

The average values for gas-works products during the week were: Gas-works coal tar, 27s. to 31s. Pitch, East Coast, 35s. to 37s. 6d. per ton; West Coast—Manchester 25s. to 30s., Liverpool 25s. to 30s., Clyde 25s. to 30s. nominal. Benzol 90 p.ct., North, 10½d. to 11½d.: 50-90 p.ct. naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha in bulk, North, 7¾d. to 8¼d. Solvent naphtha, naked, North, 3s 1d. to 3s. 2d. Heavy naphtha, North, 2s. 11d. to 3s. 1d. Creosote, in bulk, North, 4d. to 4¼d. Heavy oils, in bulk, North, 4¼d. to 5d. Carbolic acid, 60 p.ct. East and West Coasts, 2s. 6d. to 2s. 9d. naked, nominal. Naphthalene salts, £6 to £7, bags included. Anthracene, "A" quality, 4d. to 6d. per unit; "B" quality, 1½d. to 2d.

FROM A MARKET CORRESPONDENT.

Tar Products.

Conditions have changed very little since my last report—a holiday tone still pervading the markets for products. Pitch keeps prominent and in good demand, especially on Continental account. London, of course, remains the best export centre for this branch of the trade; quotations being from 57s. 6d. to 60s. per ton f.o.b. Small quantities of pitch are finding their way through from the Midlands and the North to London for shipment; but transport facilities are not very good as yet, although they are likely to improve as the result of representations being made to the railway companies concerned. This is a somewhat difficult matter to arrange, as wagons are so urgently needed for the conveyance of coal. At the same time the coal control scheme is not

saving carriage, as was hoped for, and there is, undoubtedly, a great and unnecessary wastage in wagon mileage which could be more usefully utilized in other directions, such as the carriage of pitch to the port of most convenient shipment—viz., London. Meanwhile, a few shipments are being made from the Humber ports, although there is much difficulty in arranging shipment. Taking everything into consideration, Provincial quotations are not bad, and even have a tendency to improve. Solvent naphtha is dull and inclined to weakness—quotations even come down to 2s. 6d. per gallon when the product is offered in any quantity. This refers particularly to some provincial centres; but some makers are still asking 3s. 9d. to 4s. per gallon. In direct contrast to solvent, the heavy naphtha is strong on a good demand, and makes quite 3s. 3d. per gallon. Refined naphthalene continues without alteration; but the crude is wanted again, and makes from £6 per ton for lowest up to £14 per ton for better quality. Tar is available at about 4d. per gallon in bulk. Creosote, toluol, and benzol are unchanged. The same applies to aniline oil and anthracene. Carbolic acid, crude 60 p.ct., continues at 2s. 6d. per gallon, with crystals, 40 p.ct., at 1s. 2d. per pound. Sellers of crude, however, are disinclined to sell so cheaply to makers of crystals, which are at a comparatively high figure, and some modification of rates is not unlikely in the near future. The range of quotations is as under:

Benzol: 90% London, 1s. 0½d., North 10½d. to 11½d.; 50% North 1s. 4d. to 1s. 5d. naked per gallon.

Carbolic Acid: 60% East and West Coast 2s. 6d. per gallon; crystals 40% 1s. 2d. per lb.

Crude Tar: London 32s. 6d. to 35s.; Midlands 27s. to 29s.; North 28s. to 30s. per ton *ex* works.

Pitch: London 57s. 6d. f.o.b. works; East Coast, 33s. f.o.b.; West Coast, 32s. to 33s. f.a.s.; Manchester, 32s. 6d. upwards; Clyde 32s. to 33s.; South Wales 42s.

Solvent Naphtha: London 3s. 3d. to 4s.; North and Midlands 3s. to 3s. 6d. per gallon.

Crude Naphtha: Naked 30% 8¼d. to 8½d.; North 6¼d. to 6½d.

Naphthalene: Refined £28 per ton nominal; salts 80s., bags included.

Toluol: Naked, London 2s. 4d.; North 2s. 3d.

Creosote: Nominal, London 4¼d.; North 4d. to 4¼d. (Government price, 75s. per ton f.o.b.—equal to 4½d. per gallon); heavy oil, 4¼d. per gallon in bulk.

Anthracene: "A" quality, 40-45%, 4½d. per unit; "B" quality, 1¾d. to 2¼d.

Cresylic Acid: 95%, 3s. per gallon; 97-99%, 3s. 3d. to 3s. 6d. per gallon, casks included *ex* works London and f.o.b. other ports.

Grease Oils 18° Tw. (naked) £6 per ton f.o.r. makers' works.

Sulphate of Ammonia.

No fresh developments have occurred regarding this product. Munition and chemical demands continue on the up-grade, and the requirements of agriculture are still very large. Production keeps up better than had been expected, and, of course, the export branch is practically in abeyance. The trade is still discussing what effect the diminution of coal supplies may have on production from gas plants during the winter; but it is hoped that any loss may be made good by increased outputs from coke-oven plants. News regarding the synthetic production of ammonia is still very meagre, and the market is inclined to be sceptical of its success if operated on a commercial scale.

Weymouth Consumers' Gas Company.—An increase in the sale of gas of 10·81 p.ct., as compared with the first half of 1917, was reported at last week's meeting of the Company, when the payment of a dividend on the ordinary stock at the maximum rate of 5 p.ct. per annum (less income-tax) was declared. Owing to further additions to the price of coal, and to the increase in the wages of employees, which the Company were ordered to pay by the award of the Committee on Production, the Directors were compelled to raise the price of gas to 4s. per 1000 c.ft. as from the date of the reading of the meter-indexes for the Midsummer quarter. Gas meters and stoves having kept pace in their cost with most other goods, and the charge for their maintenance being also considerably higher, the Directors have deemed it necessary to give notice of their intention to increase the hiring rates of meters and stoves on Oct. 1.

Bishop's Stortford Gas and Electricity Company.—Reporting for the six months ended June 30, the Directors of the Bishop's Stortford, Harlow, and Epping Gas and Electricity Company state that, when compared with the corresponding period of the previous year, the sale of gas shows a reduction of 2·73 p.ct.; but the revenue from the sale of residual products exhibits a small increase. The balance to the credit of the revenue account for the half year is £3474; and after providing for interest charges, an amount of £2751 is added to the profit and loss account. Dividends for the half year at the authorized rates, and income-tax thereon, will require the sum of £2726, and leave a balance of £61 to the credit of the profit and loss account to be carried forward. Further increases amounting to 4s. per ton of coal entail an additional burden upon the Company of (approximately) £1875 per annum; and the Directors have had again to advance the wages of the employees, in consequence of the general increase of wages that has taken place. These additions to the cost of production are equivalent to 6d. per 1000 c.ft. in the selling price of gas. The Directors therefore are compelled to give notice of an advance of 5d. per 1000 c.ft. in the price charged to consumers, to take effect from Sept. 30. By the operation of the sliding-scale, the distribution of profits to the stockholders for the half year ending Dec. 31 is subject to reduction to £2 18s. p.ct. per annum in the case of the "A" ordinary stock and £3 10s. in the case of the "B" ordinary stock, both less income-tax. It is anticipated, however, that the Company will obtain the relief contemplated by the provisions of the Statutory Undertakings (Temporary Increase of Charges) Act, 1918, which will permit the payment of dividends at the rate of £3 15s. p.ct. per annum on the "A" ordinary stock and the "B" ordinary stock (less income-tax).

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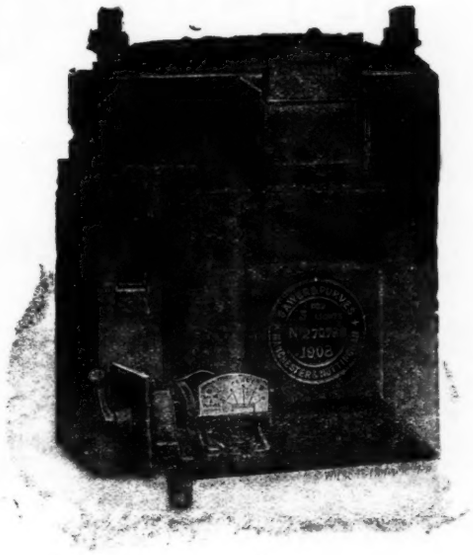

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Grays and Tilbury Gas Company.

The ordinary half-yearly meeting of the Company was held at No. 4, Eastcheap, E.C., on Monday, the 19th inst., when dividends were declared at the rates of 7½ p.ct. per annum on the "A" shares and 5¼ p.ct. per annum on the "B" shares, less income-tax. The Deputy-Chairman (Mr. Courtenay C. S. Fooks), in the absence of the Chairman (Major F. E. Bartlett) on military duties abroad, in moving the adoption of the report and accounts, drew special attention to the increase of working expenses due to the higher price of coal and oil, cost of all repairs, and the rise in the wages bill, all of which had been met by the improved revenue. With the return of normal times, there was every indication of a large expanse of the business owing to manufacturing and building developments on the north side of the Thames within the area served by the Company. The revenue account showed a profit of £5402, as against £4968 for the corresponding period of 1917. After writing off £437 for depreciation of gasholders, meters, and stoves, £100 in reduction of the suspense account, and £100 to the credit of the renewal fund, and providing for standing charges, there remained a balance to the credit of the net revenue account of £4776. The dividends will absorb £3048, leaving a balance of £1727 to be carried to the next account. Sales of gas showed an increase of 6·18 p.ct., as compared with the corresponding period of 1917. In responding to a vote of thanks to the Directors and staff, the Deputy-Chairman referred to the able and efficient manner in which the Engineer (Mr. A. W. Sumner), the Secretary (Mr. Wm. F. Whittaker), and their staffs discharged their duties.

Southend Corporation's Leigh Works.—The Southend Corporation have accepted the offer of the Southend Gas Company to continue the supply of gas in bulk to the Leigh Gas-Works for a further term of three years, and thereafter subject to six months' notice on either side, at the price of 7d. per 1000 c.ft. less than the amount charged by the Company in their lighting area to ordinary consumers, for any quantity up to 2 million c.ft. per annum, and 8d. per 1000 c.ft. less than such amount for the quantity taken beyond 2 million c.ft. in any one year, subject to not less than 750,000 c.ft. being purchased each year.

Harrow and Stanmore Gas Company.—The report for the six months ended June 30 to be submitted at the meeting next Monday, states that the increase in the sale of gas was 5·77 p.ct. over the corresponding half of the previous year. To meet the serious additional cost of coal, wages, &c., the price of gas was raised 4d. per 1000 c.ft. from Midsummer last, making it 3s. 8d. The balance standing to the credit of profit and loss is £11,393; and the Directors recommend that dividends be declared for the half year at the rate of 5¼ p.ct. per annum on the ordinary stock, and 5 p.ct. per annum on the preference stock (both less income-tax), which will leave £4620 to be carried forward.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for Aug. 21.]

Nos. 13,030—13,425.

Anderson, F. A.—"Furnaces for distillation of coal, &c." No. 13,221.

Beccari, G.—"Domestic oven for making charcoal, designed for carbonization of wood and manufacture of illuminating gas." Nos. 13,161, 13,162.

Brady, N. P. W.—See Anderson. No. 13,221.

Buckingham, E. J.—"Coal-gas carburettor for gas-driven motor-cars, omnibuses, lorries, &c." No. 13,337.

Buckingham, E. J.—"Rigid coal-gas container for compressed gas for motor vehicles." No. 13,338.

Chapman Engineering Company.—"Gas-producers." No. 13,072.

Deacon, M.—See Anderson. No. 13,221.

Hamlyn, S. W.—"Combination washer for cocks and taps, &c., for liquids and gases." No. 13,341.

Helps, G.—"Manufacture, utilization, and combustion of fuel." No. 13,256.

Hislop, G. R.—"Art of gas manufacture." No. 13,404.

Keith, G. & J.—"Governor device for gas-lighting installations." No. 13,107.

Maxted, E. B.—"Burner for oxidation of ammonia." No. 13,037.

Parsons, E. E.—"Oil-gas producer." No. 13,068.

Schmalz, C. H.—"Fluid-flow controlling valves." No. 13,353.

Simpson, R. M.—See Hislop. No. 13,404.

Smith, T. A.—See Maxted. No. 13,037.

Soddy, F.—"Method of separating and fractionating constituents of coal gas by means of charcoal and of improving absorptive power of charcoal for gases." No. 13,117.

West, E. A.—See Parsons. No. 13,068.

Gas Supply Failure at Queenstown.—A recent failure of the gas supply in Queenstown caused great inconvenience, and led to a general use in private and public buildings of lamps and candles.

Finances at Salford.—At the last meeting of the Salford Gas Committee, Alderman Phillips, J.P. (the Chairman), pointed out that, the Committee having no reserve fund, they will at an early date be compelled to consider the best means of increasing the revenue of the undertaking. Even if no further increases to employees are granted, the cost of wages this year will be much in advance of last; and all materials required are sure to show a considerable increase. Since the close of the financial year, coal had been advanced in price; and the new Lighting and Fuel Order would seriously reduce the output of gas.

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Wolverhampton Gas Company.—The Directors, in their half-yearly report, state that there has been a net profit of £8576, which, added to the balance brought forward, enables them to recommend dividends of 3 p.ct. upon the preference stock, 5 p.ct. upon the consolidated stock, and 3 p.ct. upon the new ordinary stock, less income-tax. The balance carried forward is £46,177.

Port Glasgow Gas-Works Scheme.—The Port Glasgow Town Council have had under consideration the question of building new gas-works on ground at Fyfe Shore. The estimated outlay is £60,000, exclusive of the cost of the site which the Corporation have purchased. It has been decided meantime to proceed with the erection of a new holder at Fyfe Park, and continue to make gas at the present works. This portion of the scheme will represent an outlay of £20,000.

Glasgow Gas Centenary.—Recently the Glasgow Corporation appointed a Special Sub-Committee to consider and report as to what should be done to commemorate the centenary of the lighting of the city with gas, which will occur on the 15th prox. The Sub-Committee have now agreed to recommend that, subject to the consent of the proprietor being obtained, a tablet bearing a suitable inscription be placed on the building occupying the site of the shop in Trongate where lighting by gas was first adopted in the city.

Gas Companies and Mechanical Traction on Public Roads.—On p. 362 of last week's issue, when alluding to a proposal to obtain authority to use mechanical power upon a tram road, reference was made to "the Bill promoted this year by the Aldershot District Council." This was a slip. The Aldershot District Council had nothing to do with the clause in question, which was an agreed one between the Aldershot Gas, Water, and District Lighting Company (who promoted the Bill) and the Hampshire County Council.

Wandsworth, Wimbledon, and Epsom District Gas Company.—To-day the proprietors are holding their half-yearly meeting, when accounts will be submitted showing a profit of £33,923. After providing for interest charges, there remains to the credit of the net revenue account an amount of £21,722. The Directors recommend the declaration of dividends at the statutory rates, which will require a contribution from the reserve fund of £888. It has been necessary to increase the price of gas by a further 4d. per 1000 c.ft. from Midsummer, due to the arbitration of the Committee on Production, whereby the wages have been heavily increased beyond the generous allowance for war food bonus which had previously been given by the Company. Owing, however, to the two more recent additions to the cost of coal to meet increased wages of miners, the Directors fear that the price of gas may soon have to be raised again.

STOCK MARKET REPORT.

THE Stock Exchange last week was beginning to show growing signs of relaxation under the influence of the holiday season. Perhaps this was responsible for a certain amount of irregularity of tone almost from day to day—not that there was much appearance of weakness in any quarter. Against such a phenomenon the war news, with its unbroken chronicle of the allied successes in the West, would be a guarantee, and markets were really strong, even though there was some amount of profit-snatching in a few lines. Moreover, the tone on the closing day was about the best of the week.

The gilt-edged securities were not uniformly good at first. War Loans and Consols were less firm, but, recovering promptly, they continued steady. Exchequer bonds were in good demand. Indian issues were in like favour. Home Rails opened well and afterwards drooped, but regained position before the close. Canadians and Argentines fluctuated from time to time. In the Foreign Market, Russians were coldly regarded in the first part of the week, but partially recovered later on, and French also wavered. Belgian, Greek, and Mexican were firm.

In the Miscellaneous Market, Rubber was much depressed; but Oil did fairly well. Textiles, Breweries, Meats, and Shipping were moderately well supported.

Business in the Gas Market was in point of volume on a fair scale according to the standard of holiday time; but it lacked the stimulus of the week before, which elevated the Continental undertakings to such a pitch of buoyancy. Nevertheless, they made some small further advances. Imperial Continental was put up another two points, and Continental Union one; while European scored some bargains at rather higher figures. The Metropolitan companies were firm, especially Gas Light and Coke, and the Suburban and Provincial undertakings showed some good points. Among those in remoter parts of the earth, Bombay, Monte Video, and Primitiva changed hands at figures which showed their firmness.

Bargains done for cash during the week were as follows: On Monday, European 10¼. Gas Light ordinary 64¾, 65, ditto preference 67. ditto debenture 55⅞, Imperial Continental 103, 104, Primitiva 29s. 6d., 30s., 30s. 9d., 31s., Wandsworth debenture 49, ditto Wimbledon 62⅜, Brentwood 110¾. On Tuesday, Buenos Aires 50, Continental Union 35, 36, European 10½, 10 11/16, 10⅜, Gas Light ordinary 64, 64½, 64⅝, 64⅜, 65, ditto maximum 53, 53½, Imperial Continental 102, 103½, Monte Video 9, Primitiva 29s. 9d., 30s. 9d., South Metropolitan 65, 66, Bristol 81⅛. On Wednesday, Buenos Aires 50½, British 30½, Gas Light ordinary 64½, 64⅝, 65, Imperial Continental 102, 102½, 102⅝, 103, 103½, 103⅓, 104, Primitiva 30s. 10½d., South Suburban 69⅜. On Thursday, Alliance and Dublin 53¼, 53⅜, Gas Light maximum 53¼, 53½, Imperial Continental 103, 104½, 105, Newcastle and Gateshead 65, Primitiva debenture (1911) 50, 50½, South Metropolitan 65½, 66, British (Hull) debenture 62½, 63. On Friday, Bombay 5⅜, Brentford debenture 63½, Continental Union 35, 35¼, Gas Light ordinary 64½, 65, ditto maximum 53½, Imperial Continental 104, 105, 105½, South Metropolitan 66.

In the Money Market, rates became firmer, but eased away before the close. The Bank rate is 5 p.ct., as fixed on April 5, 1917.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue £	Share.	When last Dividend.	Ante-War Dividend & Bonus p.c.	Last Dividend.	NAME	Closing Prices, July 30 1914	Present Prices	Lowest and Highest Prices of Bargains.
189,049	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	65—60*	..
1,551,868	,,	April 8	9½	4¾%	Alliance & Dublin Ord.	59—64	50—55*	53¼—53½
374,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	67—69	..
280,000	5	April 29	7½	8%	Bombay, Ltd.	5⅞—6⅛	6—5½	6⅛
50,000	10	Feb. 26	16	11%†	Bournemouth Gas and Water { 10 p.c. B 7 p.c. Pref. 6 p.c. 4 p.c. Deb.	29—30	21—25	..
388,110	10	,,	7	7%		15—15½	10½—11	..
115,000	10	,,	6	6/-		13⅛—14	9½—9⅝	..
159,740	—	—	—	4%		..	66—68	..
992,045	Stk.	Feb. 26	14	4¾%	Brentford A Consolid.	261—266	73—76	..
784,290	,,	,,	11	4¾%	Do. B New	204—209	65—68	..
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	77—82	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb.	91—93	62—64	63½
217,880	,,	Feb. 26	11	9%	Brighton & Hove Orig.	208—213	135—140	..
244,200	,,	,,	8	6%	Do. A Ord. Stk.	154—159	95—100	..
530,000	20	Mar. 26	12½	22/6	British	44—45	30—31	30½
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	64—66	..
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	50—53	50—50½
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1¼—2½	⅞—1	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—6	7—8	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	60—65	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	79—81	..
1,513,280	,,	Feb. 12	5/9/4	36/-†	Commercial 4 p.c. Stk.	106—108	57—62	..
560,000	,,	,,	5½	30/-†	Do. 3½ p.c. do.	103—105	54—59	..
475,000	,,	June 11	8	8%	Do. 3 p.c. Deb. Stk.	69½—71½	51—53	..
800,000	,,	,,	4	—	Continental Union Ltd.	76—79	33—38	35—36
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	57—62	..
278,400	—	—	—	10½%†	Croydon B and C 7 p.c..	..	150—160	..
—	—	—	—	10%	Do. E	..	..	..
493,270	Stk.	—	6	6½%	Derby Con. Stk.	123—125	95—100	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,002,180	10	July 29	10	5/0	European, Ltd.	17½—18	10—11	10¼—10⅝
16,298,975	Stk	Feb. 10	4/17/4	29/4	Gas Light and Coke { 4 p.c. Ord. 3½ p.c. max. 4 p.c. Con. Pref. 3 p.c. Con. Deb. 10 p.c. Bonds	98—102	63—65	64—65
2,600,000	,,	,,	3½	3½%		76—79	52—54	53 53½
4,062,285	,,	,,	4	4%		96—99	66—68	67
4,674,850	,,	June 11	8	8%		72½—74½	54—56	55½
180,000	,,	,,	10	10%		..	..	..
258,740	,,	Mar. 12	5	3½%	Hastings & St. L. 3½ p.c.	87—89	46—51	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16¾	7—8	..
86,600	—	—	—	9½%	Hornsey 7 p.c..	..	115—125	..
131,000	Stk.	Mar. 12	7½	7%	Ilford A and C.	151—154	90—95	..
65,780	,,	,,	6½	6½%	Do. B.	115—118	70—75	..
65,500	,,	June 26	4	4%	Do. 4 p.c. Deb.	92—94	62—65	..
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	104—107	102—105½
1,235,000	,,	Feb. 12	8½	8½%	Do. 8½ p.c. Deb. Red.	84—86	67—69*	..
235,242	,,	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	92—97	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. { A B	211—213 148—148	82—84	..
806,068	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	71—73	..
75,000	5	June 11	6	2/-	Malta & Mediterranean Met. of Melbourne { 4½ p.c. Deb.	4⅛—4⅜	3½—3½*	..
250,000	100	April 1	4½	4½%		99—101	88—99	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	8⅞—9⅛	9
1,875,892	Stk.	July 29	4½	3½%	Newcastle&Gatsh'd Con.	96½—99½	64—66	66
539,705	,,	June 26	8½	8½%	Do. 3½ p.c. Deb.	82—83	59—61	..
55,940	10	Feb. 26	7/14/0	7/-	North Middlesex 7 p.c..	14—15	9½—10⅛	..
800,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	101—103	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7⅞	3—4	..
50,000	50	Feb. 26	13	9%†	Portsea, Island B	128—131	80—85	..
100,000	50	,,	12	8½††	Do. C	118—121	75—80	..
52,000	50	,,	10	6%†	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5⅛—6	1⅝—1⅞	29/6—31/-
499,960	5	June 26	5	3/6	Do. 5 p.c. Pref.	4—5	2⅜—2⅝	..
621,800	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	75—77	..
—	—	—	—	4½%	Do. ,, ,, 1911	..	50—55	50—50½
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	55—60	..
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref. 5 p.c. Deb.	10⅛—11	7¼—7⅜	..
125,000	50	July 1	5	5%		47—49	40—42	..
185,000	Stk.	Mar. 12	10	10%	Sheffield A	223—224	..	..
909,984	,,	,,	10	10%	Do. B	222—224	174—177	..
633,500	,,	,,	10	10%	Do. C	220—222	..	..
90,000	10	May 28	9	6/-	South African	10½—11½	10—11	..
6,609,895	Stk.	Feb. 10	5/4/0	32/-	South Met. 4 p.c. Ord.	111—118	65—67*	65—66
250,000	,,	July 12	—	5%	Do. Pref.	..	91—93	..
1,895,445	,,	July 10	8	8%	Do. 3 p.c. Deb.	72½—74½	53—55	..
224,290	,,	Feb. 26	8½	6%	South Shields Con. Stk.	157—159	121—123*	..
962,795	,,	,,	6	3½%	S'th Suburb'n Ord. 5 p.c.	114—116	68—70*	69½
60,000	,,	,,	5	5%	Do. 5 p.c. Pref.	110—112	72—74*	..
185,000	,,	—	—	3½%	Do. West Kent	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	82—84	..
647,740	,,	May 14	5	3%	Southampton Ord.	99—102	74—76	..
120,000	,,	Feb. 12	7½	5½%	Tottenham District { A 5 p.c. B 3½ p.c. 4 p.c. Deb.	135—138	88—93*	..
782,275	,,	,,	6	4%		115—117	64—66*	..
181,255	,,	June 26	4	4%		87—89	61—63	..
189,880	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	..
286,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max..	108½—109½	87—88	..
80,000	,,	Feb. 26	8⅜	63/9†	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c..	151—156	90—95	..
255,636	,,	,,	6⅞	48/9†	Do. B 3½ p.c.	129—134	70—75	..
108,075	,,	,,	5/17/8	44/9½†	Do. C 3½ p.c.	110—115	70—75	..
852,000	,,	,,	6¼	42/6†	Wimbledon 5 p.c.	117—122	70—75	69⅜
98,000	,,	,,	6⅜	48/9†	Epsom 5 p.c.	121—126	70—75	..
88,416	,,	June 26	8	8%	8 p.c. Deb. Stk.	66—69	48—51	49

* Ex Div. † Next Dividend will be at this rate.

Shrewsbury Gas Light Company.—There was, during the twelve months ended June 30 last, an increase of 8½ p.ct. in the consumption of gas at Shrewsbury; and the profit of the Company on the year's working amounts to £2835. To make the dividend up to 4 p.ct. for the year, £1771 will be drawn from the reserve fund.

Oldham Gas Matters.—At the last meeting of the Oldham Corporation Gas Committee, it was stated that the increased cost of production during the next twelve months would be (with the loss incurred last year) over £60,000. The increase of 4s. a ton in the cost of coal would amount to £25,000 for the year, and wages were likely to be £16,000 more than during the previous twelve months. It was agreed to consider the price of gas at a meeting of the Committee, tomorrow week.

Matlock Gas Undertaking and Fuel Shortage.—The Matlock Bath gas undertaking is in a somewhat serious position, as the result of the shortage of fuel. The Manager reports that their supplies of coal have been considerably interfered with, and they are now dependent upon day to day consignments. Despite this scarcity of coal, however, the gas sent out for July shows an increase over the quantity for the same month of last year. The Gas Committee have decided to take steps to popularize the use of coke in the town for the coming winter.

Increases in Gas Prices.—The price of gas is to be raised 4d. per 1000 c.ft. at Blyth, after the September meter readings. At present the charge is 3s. 4d. The new prices of gas which will take effect at Manchester after the readings of the ordinary meters for the September quarter range from 3s. 6d. per 1000 c.ft. for quantities under 250,000 c.ft., to 3s. for quantities of 5,000,000 c.ft. and upwards. For gas-engines, the price will be 3s. 1d. under 1 million c.ft. down to 2s. 11d. for 2 millions and upwards—all subject to a discount of 2d. per 1000 c.ft. for payment within 28 days from delivery of the account. Public lamps, 2s. 10d. per 1000 c.ft. Automatic meter users within the city will receive 22 c.ft. for 1d.; and those outside the city boundaries, 20 c.ft. The Radcliffe and Pilkington Gas Company will, after the reading of the meters for the current quarter, advance the price 3d. per 1000 c.ft., and reduce the quantity of gas for 1d. to prepayment users from 20 to 18 c.ft. The Stretford Gas Company notify an increase in the price of gas by 4d. per 1000 c.ft. to all consumers through ordinary meters.

Gas Supply of Townsville (North Queensland).—There was some falling off during the year ended March last in the output of gas by the Townsville Gas Company, owing to various strikes in North Queensland and New South Wales, all of which interfered with the operations of the Company. As in this country, coal and wages are costing much more than formerly; and the Directors regretted that the profits had not justified the payment of the usual half-yearly dividend, either in November last or at the present time. The net profit for the year was £2594; and at the annual meeting the Directors recommended that £2000 of this sum should be transferred to the reserve account. The Gas Act became operative on April 1, 1917; but the Gas Referees' decision, fixing the price to be charged for gas in Townsville, was not delivered until Dec. 10. Meanwhile, the Company were compelled to charge the rates for gas which were in force on Nov. 1, 1915. During this period, the price of coal was increased and the rates of wages advanced; and as a consequence the loss to the Company on the sale of gas between the date of the introduction of the Act and the date of the Referees' decision, was very considerable. The further increase in the price of coal, and the prospective wages advances, will seriously affect the earnings of the Company during the current year.

Middleton Gas-Works Finances.—The Middleton Gas-Works revenue account for the year ended March 31 shows a total expenditure of £30,014, and an income of £31,660; being £2540 and £3742, respectively, in excess of the amounts for the previous year. The expenditure comprised: Manufacture of gas, £16,017; distribution, £1545; rates, taxes, &c., £3623; management (including allowances and war bonus), £2446; and interest and sinking fund, £6383. The income consisted of sales of gas, £22,174; residuals, £9441; and bank interest, £45.

Camborne Gas Company.—Presiding at the annual meeting on Friday last, Mr. T. H. Cadwell said there had been a considerable increase in the output of gas; but the cost of production had enormously increased. Mr. S. J. Ingram, the Consulting Engineer to the Company, was elected a Director. He remarked that the outrageous rise in the price of coal was a very serious matter for gas undertakings. All the miners had to do was to ask for a rise in wages, and it was granted. The price of coal then went up, and the miners used this as an excuse to get a further rise. It was decided to pay a dividend of 4 p.ct.

Gas Workers' Wages in Ireland.—A general meeting of the men employed by the Alliance and Dublin Consumers' Gas Company adopted a resolution calling upon the Munitions Ministry to constitute the Company's undertaking a controlled establishment; the wages to be based on the award of the Committee on Production to date. This latter would mean an increase of 23s. 6d. per week on pre-war rates, *plus* 12½ p.ct. bonus on earnings, or a total of 28s. 6d. Since the outbreak of war, the men had received advances ranging from 13s. to 18s. per week. Limerick gas workers, who had threatened to strike last week on a demand for £1 a week increase on pre-war wages, accepted an offer of 16s.; the remaining 4s. to be dealt with by arbitration.

Co-Partnership at Aldershot.—The co-partnership report for the past year of the Aldershot Gas, Water, and District Lighting Company states that the ordinary bonus was at the rate of 1¾ p.ct. per annum, and amounted to £325. In addition, a supplemental war bonus has been paid, representing a grant of £933, and making a total distribution of £5302 since the inception of the scheme. The number of co-partners is 190; and the nominal amount of stock transferred now totals £2282. The Committee call attention to the fact that, while on the scale at present in force the bonus (with gas at the standard rate which it has now reached) runs out, the Directors have inaugurated a new scale dating from July 1 last, based on the dividend of the Company's "B" stock. With gas at 3s. 8d. per 1000 c.ft., the bonus is £3 10s. p.ct. per annum. For every penny above 3s. 8d., the bonus is reduced 1s. 6d. p.ct.; for every penny below 3s. 8d. down to 2s. 4d., the bonus is increased 6s. p.ct.; and for every penny below 2s. 4d., it is increased 12s. p.ct.

The Federation of British Industries have invested a further £50,000 in National War Loan.

The salary of Mr. H. Banyard, Manager of the Haverhill Gas-Works, has been increased by £20 per annum.

At the conclusion of the business of the ordinary meeting to-day of the City of Chichester Gas Company, there will be an extraordinary meeting of the proprietors, at which a resolution will be submitted empowering the Directors to make application for relief under the Statutory Undertakings (Temporary Increase of Charges) Act.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

Gas Engineer and Manager. Padiham Urban District Council. Applications by Sept. 7.

Assistant to Engineer and Manager. Woking Gas-Works.

Assistant Manager. No. 6486.

Technical Assistant and Junior Technical Assistant. Nelson Gas Department. Applications by Sept. 8.

Junior Chemist (Male or Female). No. 6487.

Draughtsman. No. 6476.

Appointments, &c., Vacant (*Continued*).

Retort House Foreman. Stretford Gas Company.

Foreman Fitter. No. 6485.

Carbonizing Foreman. Heywood Gas-Works.

Plant, &c. (Second Hand) for Sale.

Ammonia Plant.—R. Sizer, Ltd., 82, Mark Lane, E.C. 3.

Steam Engine and Exhauster. Cambuslang Gas-Works.

Meter. William Dixon, Ltd., Glasgow.

Plant, &c. (Second Hand) Wanted.

Pressure Plant or Gasholder. Gems, N. Kensington.

Patent Licence.

Mantles. D. Young & Co., 11 and 12, Southampton Buildings, W.C.

Meetings.

Brighton and Hove Gas Company, No. 5, Great Winchester Street, E.C. Sept. 13, 2 o'clock.

Tar. TENDERS FOR

Blackpool Gas-Works. Tenders by Sept. 19.

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See Illustrated Advertisement, Aug. 20, p. 368.

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